Founded in 1832

RAILWAY LOCOMOTIVES AND CARS

NOVEMBER 1954

One of Five Specialized Railway Age Publications

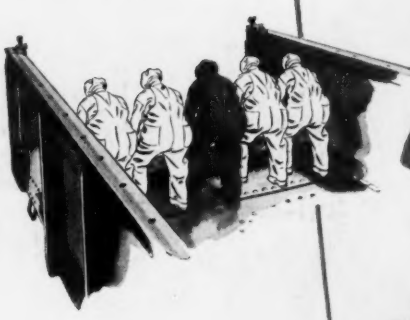
formerly Railway Mechanical and Electrical Engineer

Schoolroom On Wheels

North Western Battery Shop

Shop Ideas for Car Repair Man

Reclaiming Cylinder Heads



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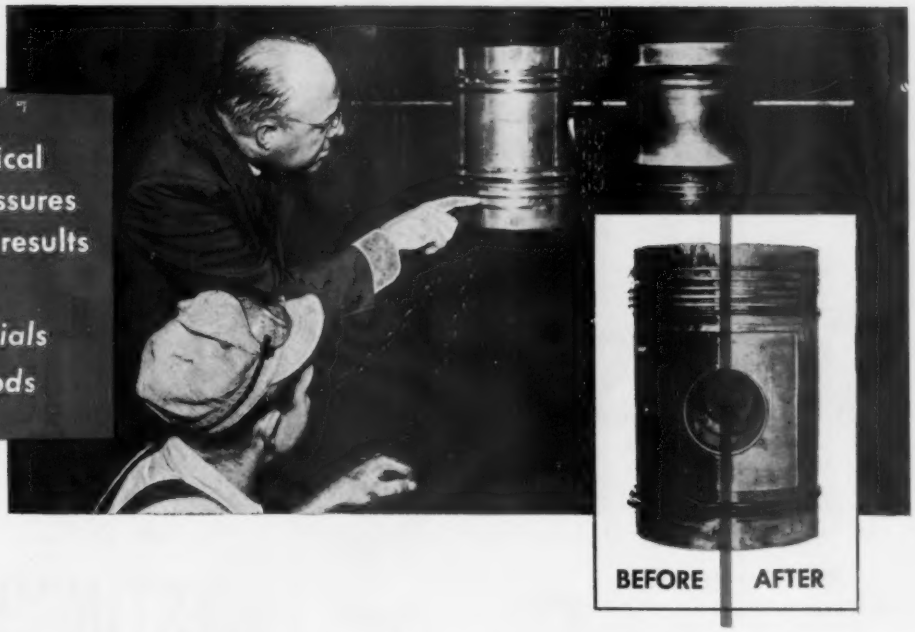

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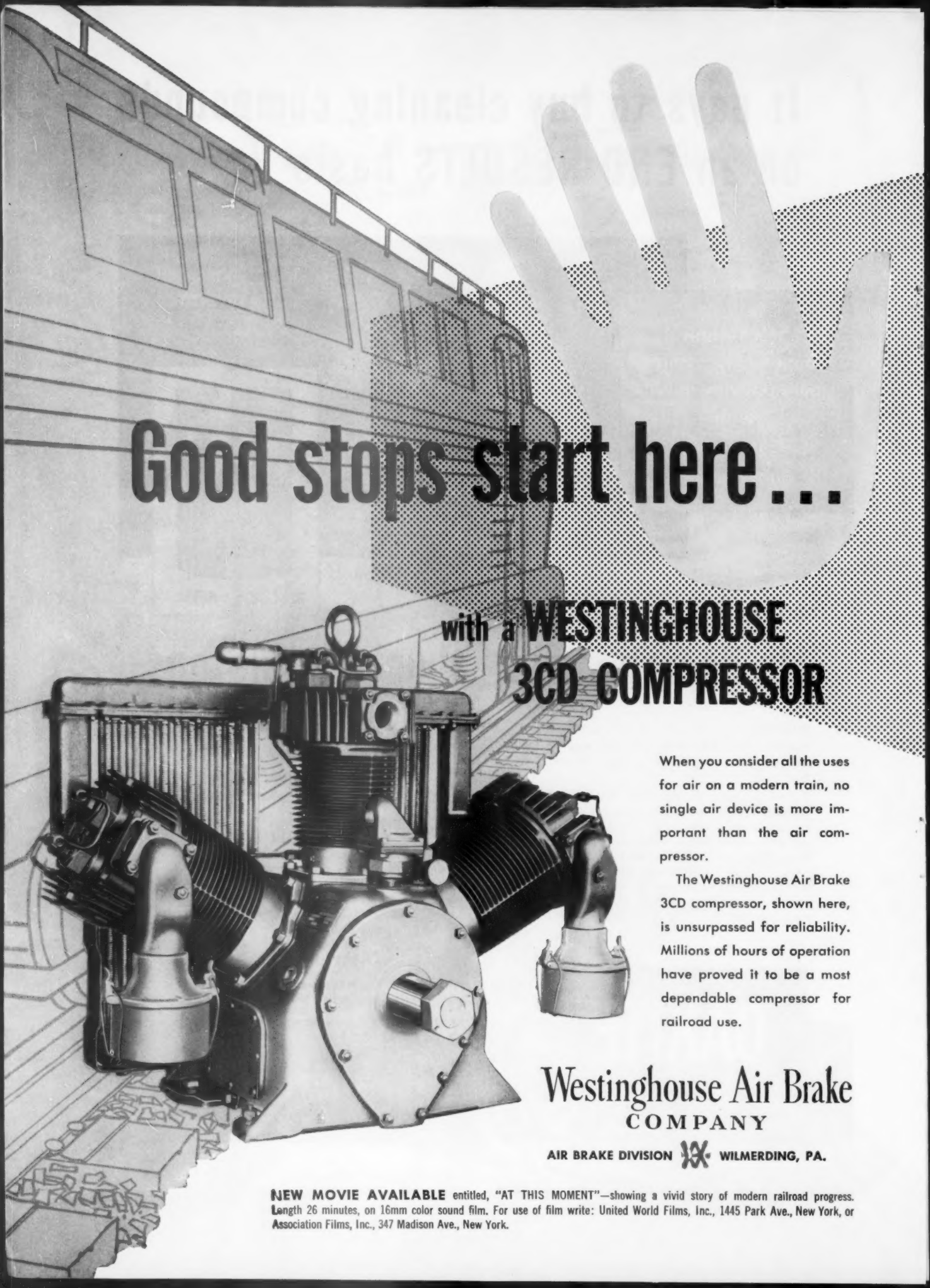

When you consider all the uses for air on a modern train, no single air device is more important than the air compressor.

The Westinghouse Air Brake 3CD compressor, shown here, is unsurpassed for reliability. Millions of hours of operation have proved it to be a most dependable compressor for railroad use.

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November, 1954
VOLUME 128
No. 11

RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal.

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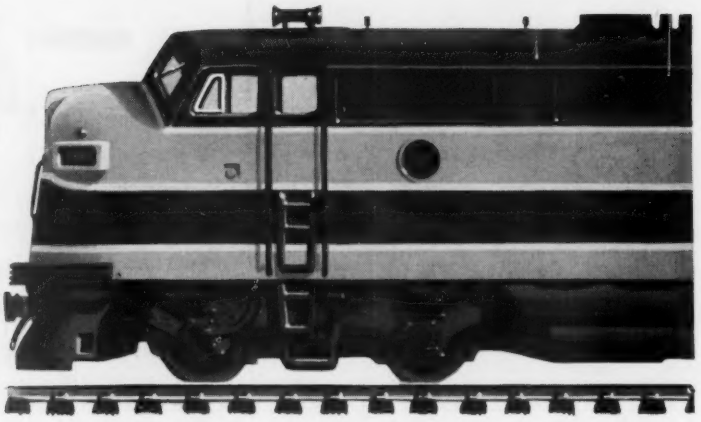

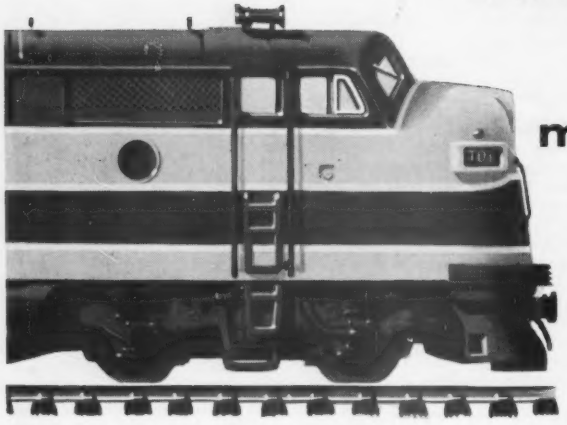

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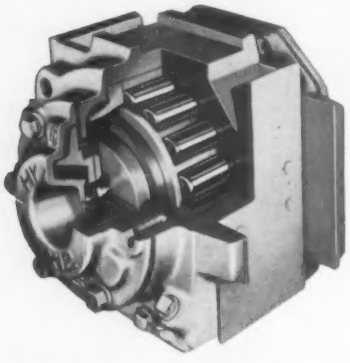

**Shipped December 14th, 1953*

When GM's Electro-Motive Division passed an important production milepost recently, Hyatt passed one, too. For when EMD delivered its 15,000th diesel locomotive to Union Pacific, it reminded us that we have supplied EMD with more than 100,000* roller bearing journal boxes.

Naturally, we're proud of that record, just as we're proud to be a major supplier of journal boxes to all other locomotive builders. In fact, we take greatest pride in knowing that of all road diesels now in service, *seven out of every ten roll on Hyatts!*

Because of our leadership in solving the bearing problems with diesels and passenger cars, more and more railroads are turning to "*Hyatts for Freight.*" When *your* railroad comes to grips with the freight car problem, be sure to get *all* the facts about roller bearings. If you do, you'll buy Hyatts.

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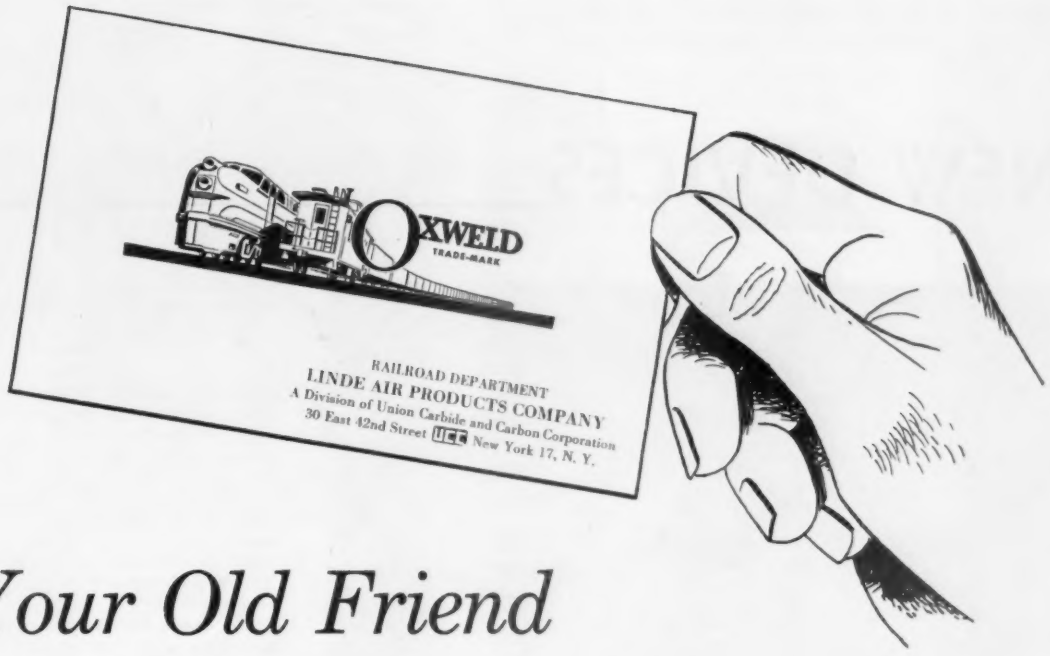
OXWELD
TRADE-MARK
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LINDE AIR PRODUCTS COMPANY
A Division of Union Carbide and Carbon Corporation
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Your Old Friend Presents a New Card

The men you have known as representatives of Oxweld Railroad Service Company will now be calling on you as representatives of the newly formed Railroad Department of Linde Air Products Company.

The combination of these two Divisions of Union Carbide and Carbon Corporation has been effected so that you may be better served and have the full benefit of the combined knowledge and facilities of both organizations. Men of the OXWELD organization bring to the new Railroad Department years of valuable experience and a thorough knowledge of the railroad industry.

LINDE men, in turn, bring wide skill in welding and cutting applications in a broad range of other industries that may be adapted for railroad use. In addition to your old OXWELD friends you will soon meet other LINDE representatives for the first time. You may be sure that these new friends will be just as helpful and co-operative as the OXWELD people who have served you in the past.

LINDE's coast-to-coast chain of District and Region Offices will now be able to serve more closely the needs of the railroad industry for apparatus and welding supplies, and the helpful technical service for which both LINDE and OXWELD have long been noted.

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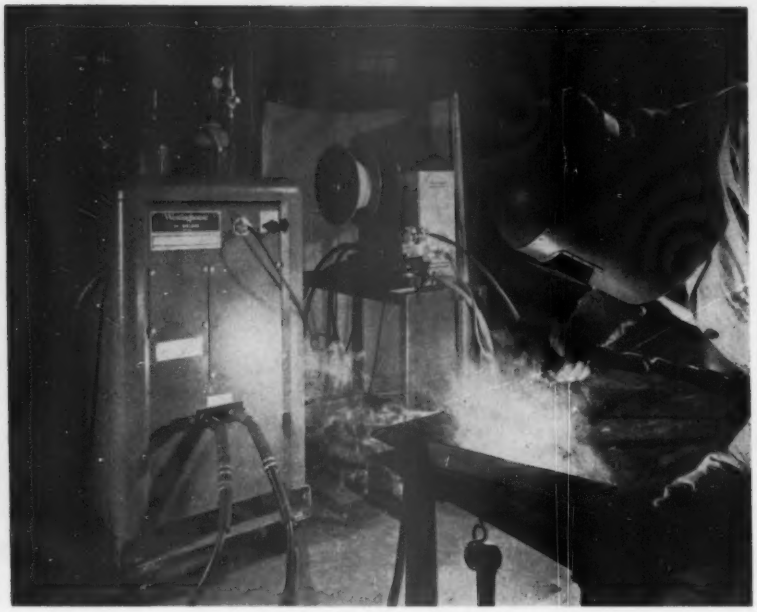
NEW DEVICES



The West-ing-arc welding equipment comprises the MS-20 wire, the welder (left) the gun (right), and the wire feed control (center rear).

Welding Process Cuts Costs

A newly developed coated wire electrode—West-ing-arc MS-20—is the key to a Westinghouse Electric Company consumable electrode inert-gas arc-welding process, the main advantages of which are higher welding speeds, better quality welds and lower operating costs. The consumable-electrode process has been used for several years to weld stainless steels, aluminum and other nonferrous metals. The new process now brings its advantages of speed, higher quality and cleaner welds to the horizontal and flat-position welding of mild steel in thicknesses from 1/16 in. up at economical operating costs. It can be used either as a semiautomatic process, where the operator holds the gun, or as an automatic process, where the gun is clamped in position, or where the wire is fed through an automatic head. It is not yet developed for vertical or overhead welding.

The MS-20 wire is mild steel of special analysis made in four sizes from 0.040 to 0.091 in. and covered with a thin coating of special composition. This makes it possible to weld with straight polarity—the electrode as the negative terminal—at high melting rates without the poor arc stability, heavy spatter and poor penetration which accompany straight polarity welding with uncoated electrodes. Comparison of the metal deposition rates of the MS-20 and a typical consumable electrode indicate that the new electrode is from 15 to 22 per cent faster. There is no slag deposit and the welds can be painted without cleaning.

Because of the arc stability with the new electrode, less argon gas is required to shield the arc. There is a reduction in total cost per inch of metal deposited of 25 per cent, including time welding, cost of materials, and time required for cleaning and grinding preparatory to painting.

In addition to the wire, the complete process includes a newly designed welding gun, wire control, and a new constant-potential power source. The electrode gun, rated at 500 amp, is light and well balanced. No tubing is exposed on the gun, which delivers wire, power, gas and water. The tip is designed for high water-cooling efficiency.

The control for feeding the wire is designed to supply wire at a constant preselected speed under all loads. Designed for portability, the control panel is light weight and operates from a conventional 110-volt ac supply.

The constant-potential power supply is rated 220/400-volts, 60 cycles, 3 phase. Its design includes a selenium rectifier to produce the ac power. Its continuous rating is 550 amp at 34-volt load. The volt-ampere characteristics are relatively flat: the potential drop from no load to full load is six volts. Efficiency is about 82 per cent and the power factor above 95 per cent at continuous rated load.

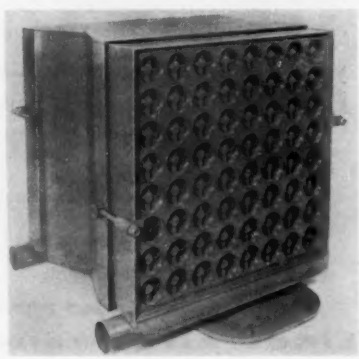
The four component—the wire, the gun, the control and the welder—constitute the complete West-ing-arc process. Considered separately, each can be used effectively—*Westinghouse Electric Corporation, Arc Welding Department, Buffalo, N. Y.*

Rotonamic Air Filters

The Rotonamic air cleaner for Diesel locomotives is the result of a development program initiated in 1948. Today, initial development phases are complete and considerable service history has been accumulated.

The familiar panel type, viscous coated, cleanable air filter is widely used for engine air cleaning with or without carboy filters. The success of this system of air cleaning depends on regular filter changes and a well controlled filter cleaning and reoiling program. The cost of maintenance can be reduced if the service life of the filter can be extended without endangering engine life.

A cyclonic type of air cleaner offered about the only feasible means of operating without filter maintenance. High efficiency of the impingement type filters in use required that the cyclone element be small in diameter.



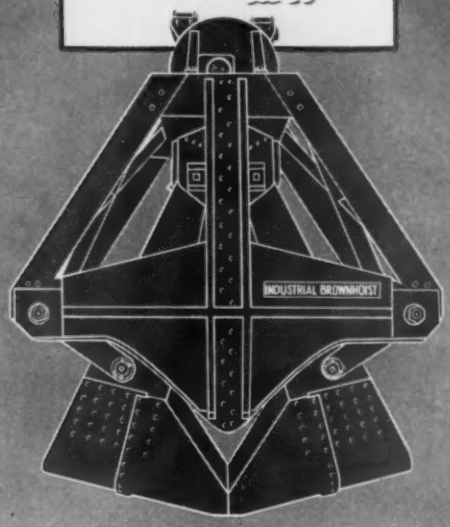
To reduce maintenance to a minimum, a bleed-off type of cyclone was decided upon as providing the best means of con-

(Continued on page 96)

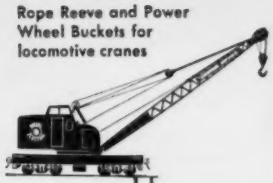
BROWNHOIST

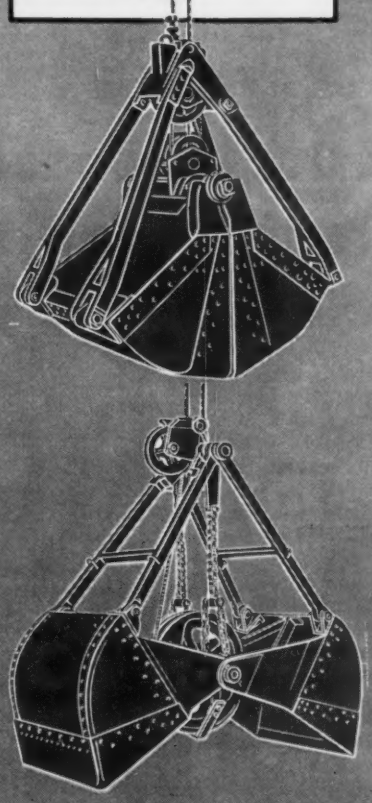
ALSO BUILDS BETTER BUCKETS

Link Type Buckets for boat unloaders, bridge cranes, fast plants



Rope Reeve and Power Wheel Buckets for locomotive cranes





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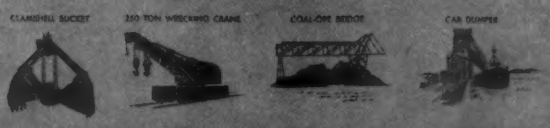
Brownhoist Buckets are designed for specific jobs and especially engineered to meet the toughest materials handling requirements. They take deep, full capacity bites that move more materials per lift, thus making possible considerable savings in man-hours and production time. They are built for endurance and dependability, the same qualities that have accounted for Brownhoist leadership in the bulk materials handling field for more than three quarters of a century. Railroads, steel mills and dock operators who are loading and unloading coal, ore, slag or other bulk materials will find it pays to discuss their requirements with Brownhoist engineers.

BROWNHOIST builds better cranes



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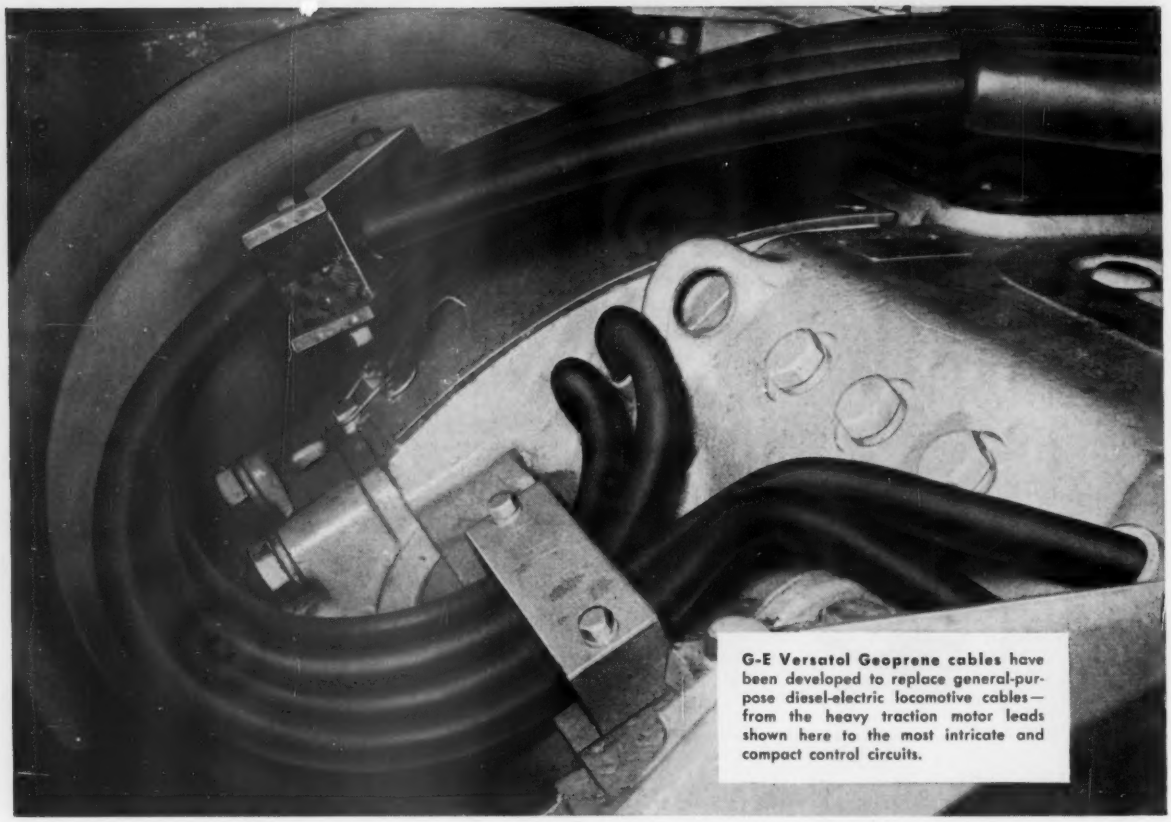

G-E Versatol Geoprene cables have been developed to replace general-purpose diesel-electric locomotive cables—from the heavy traction motor leads shown here to the most intricate and compact control circuits.

Replace Diesel-electric Locomotive Wiring with G-E Versatol Geoprene Cable—Size for Size

Now a single type of cable, G-E Versatol* Geoprene, can be used to replace the many types of general purpose cables used as original equipment on all diesel-electric locomotives. Versatol Geoprene, a rugged cable that has been tested for diesel-electric service under the most severe operating conditions, can be used to rewire power and control circuits—in the same sizes as the original wiring.

G-E Versatol Geoprene makes terminal attachment easy, because the copper stranding is always concentric and always of the correct diameter. This cable resists water, oils, live steam, ice, and cleaning compounds. It is extremely flexible and easy to pull through conduit. The insulation strips cleanly and easily.

This cable can help you simplify your inventory problem because you need to carry only one type in stock. G-E Versatol Geoprene is available in size No. 14 Awg and larger with a 1000-volt rating for power circuits, and No. 16 and No. 14 Awg with a 300-volt rating for control circuits. Special cables are available for installations in high-temperature areas.

*Registered Trade-mark General Electric Company

For more information write for the specification folder "G-E Diesel-electric Locomotive Cable". Section W130-1147, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

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Equip your work crews with lighter, more flexible, stronger Yellow Strand Braided Safety Slings — and lower your lifting costs. Skilled Broderick & Bascom sling engineers are ready to serve you — without charge — recommending and designing the sling that best fits your needs. Write for information.

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Coil it, bend it, tie it in a knot, a non-marring, non-slip Yellow Strand Braided Safety Sling is as flexible as a manila rope. The sling, illustrated above, is 16-feet long, weighs 44 pounds, and is easily carried by one man. Slings have 30% less bulk, 68% less weight and 13% more strength than alloy chain slings. They're easily stored, easily transported. The slings are constructed of higher quality Yellow Strand Wire Rope, assuring longer life, greater safety and easier handling.

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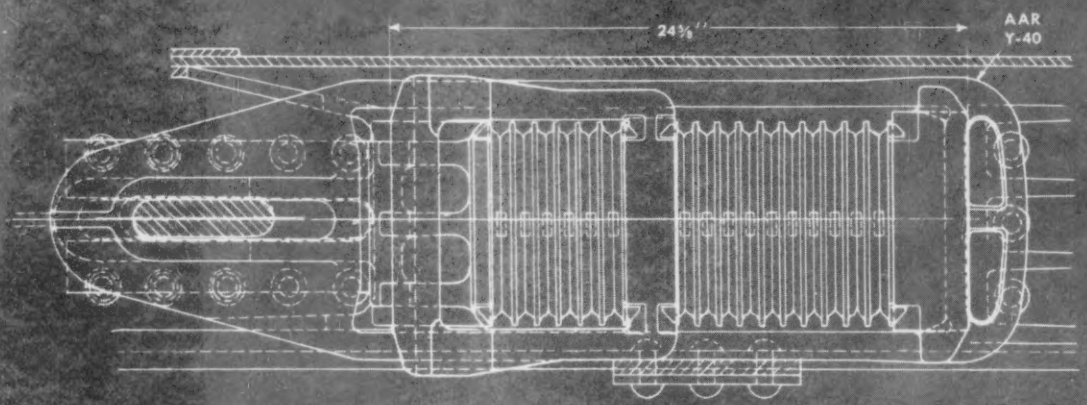
BRAIDED SAFETY SLINGS

FOR SAFETY . . . SERVICE . . . SAVINGS . . .

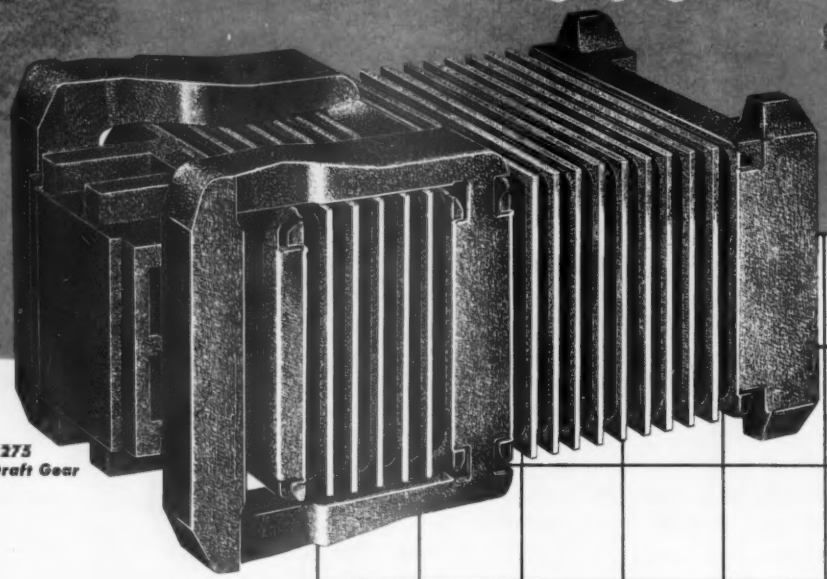
NATIONAL designed

Multi-Pad Rubber Draft Gears

to fit AAR Standard Yokes and Standard Construction

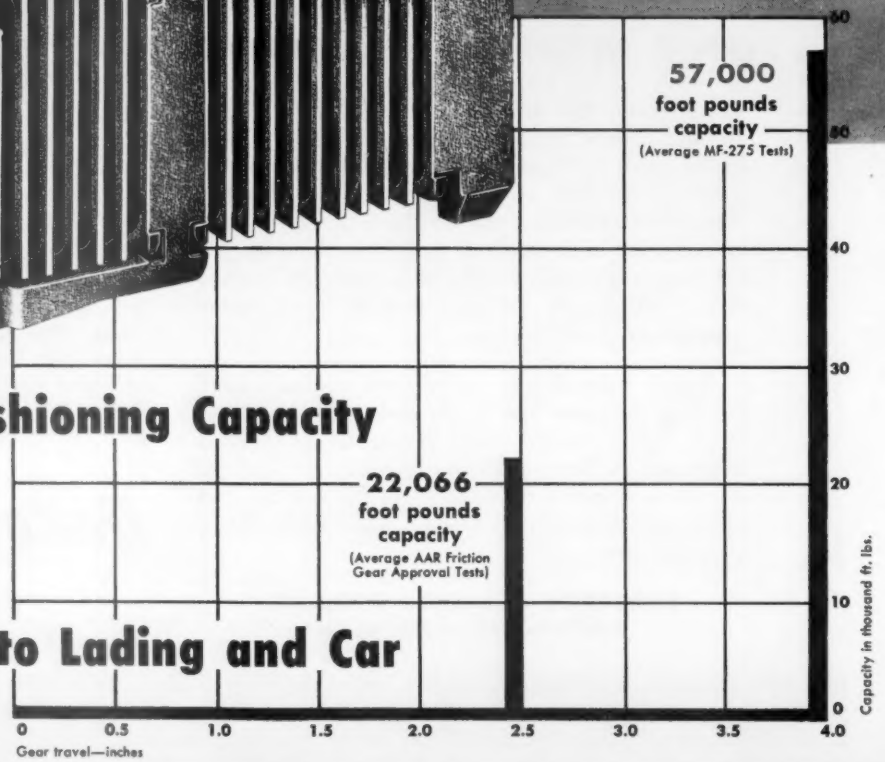


slack free!



MF-275
Rubber Draft Gear

for Greater Cushioning Capacity



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NEWS . . .

ASME Annual Meeting

The American Society of Mechanical Engineers haas chosen the "Influence of Science and Engineering on Modern Civilization" as the keynote for its annual meeting to be held in New York November 28-December 3. Headquarters will be the Hotel Statler. The Hon. Thomas C. Desmond, Senator, New York State, will present the Roy V. Wright Lecture at 5 pm on Tuesday, November 30. J. R. Dunning, Dean of Engineering, Columbia University, will be the speaker at the annual banquet 7 pm on Wednesday, December 1.

The program, in part, is as follows.

MONDAY, NOVEMBER 29

9:30 am

Lubrication (I)—Railroad (I)

Load Capacity and Time Relations for Squeeze Films, by F. R. Archibald, Arthur D. Little, Inc.

Preliminary Investigation of Minimum Oil-Feed Rates for Fluid-Film Conditions in Journal Bearings, by Didley D. Fuller, Columbia-University, and Bano Starzizicht, General Electric Co.

Bearing-Material Evaluation for Railroad Use, by G. M. Robinson, Franklin Institute Laboratories.

8 pm

Junior—Education (III)—Management (III)

Panel: Training the Engineer—Whose Job Is It?

Moderator: Robert Nelsen, General Electric Co.

Panel members: Education—David L. Arm, University of Delaware; Industry—D. F. Pratt, Cincinnati Milling Machine Co.

TUESDAY, NOVEMBER 30

9:30 am

Fuels (IV)—Gas Turbine Power (II)—Railroad (II)

Heat Processing Combustible Materials by High Temperature Gas Generation and by Direct Flame Impingement

Flame-Stabilized Oxy-Fuel Burners

12:15 pm

Fuels Luncheon

Speaker: Daniel P. Barnard, Deputy assistant secretary of Defense for Research and Development, Washington, D. C.

Subject: Evolving Patterns in Fuels and Energy.

2:30 pm

Oil and Gas Power (II)

General Technical Committee Meeting on Turbocharging of Two-Cycle Internal Combustion Engines

Panel members: L. Carletti, Brown-Boveri Corp.; C. A. Chamberlain, Clark Brothers; R. F. Miaskiewicz, Elliott Co.; Rudolph Birmann, DeLaval Steam Turbine Co.; Nelson Reed, Cooper-Bessemer Corp.

Gas Turbine Power (III)

Recent Progress in Treatment of Residual Fuels for Gas Turbines.

A 5,000-Kw Railway-Mounted Gas-Turbine Power Plant.

WEDNESDAY, DECEMBER 1

9:30 am

Gas Turbine Power (IV)-Fuels (V)

(*Continued on page 14*)

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of July 1954	Month of July 1953	7 months ended with July 1954	7 months ended with July 1953
3	Road locomotive miles (000) (M-211):				
3-05	Total, steam	5,998	12,532	44,215	87,479
3-06	Total, Diesel-electric	33,089	32,004	224,121	215,948
3-07	Total, electric	629	715	4,500	5,153
3-04	Total, locomotive-miles	39,912	45,323	273,624	309,010
4	Car-miles (000,000) (M-211):				
4-03	Loaded, total	1,484	1,646	10,376	11,591
4-06	Empty, total	914	968	6,147	6,372
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01	Total in coal-burning steam locomotive trains	12,131	22,296	87,039	156,035
6-02	Total in oil-burning steam locomotive trains	2,383	6,767	15,473	42,465
6-03	Total in Diesel-electric locomotive trains	90,245	87,945	617,575	603,142
6-04	Total in electric locomotive trains	1,885	1,969	13,785	14,561
6-06	Total in all trains	107,256	119,184	736,582	817,654
10	Averages per train-mile (excluding light trains) (M-211):				
10-01	Locomotive-miles (principal and helper)	1.02	1.03	1.02	1.03
10-02	Loaded freight car-miles	39.80	39.40	40.60	40.70
10-03	Empty freight car-miles	24.50	23.10	24.10	22.30
10-04	Total freight car-miles (excluding caboose)	64.30	62.50	64.70	63.00
10-05	Gross ton-miles (excluding locomotive and tender)	2,876	2,850	2,882	2,870
10-06	Net ton-miles	1,258	1,284	1,269	1,300
12	Net ton-miles per loaded car-mile (M-211)	31.60	32.60	31.20	32.00
13	Car-mile ratios (M-211):				
13-03	Per cent loaded of total freight car-miles	61.90	63.00	62.80	64.50
14	Averages per train hour (M-211):				
14-01	Train miles	18.80	18.00	18.80	18.20
14-02	Gross ton-miles (excluding locomotive and tender)	53,377	50,638	53,767	51,673
14	Car-miles per freight car day (M-240):				
14-01	Serviceable	42.00	45.40	42.10	45.60
14-02	All	39.50	43.20	39.80	43.40
15	Average net ton-miles per freight car-day (M-240)	772	887	781	896
17	Per cent of home cars of total freight cars on the line (M-240)	53.00	46.00	54.00	46.70

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):				
3-05	Steam	2,314	4,530	16,909	31,938
3-06	Diesel-electric	21,662	21,207	145,856	140,131
3-07	Electric	1,407	1,559	9,793	10,837
3-04	Total	25,385	27,298	172,560	182,907
4	Passenger-train car-miles (000):				
4-08	Total in all locomotive-propelled trains	257,171	279,277	1,726,698	1,844,678
4-09	Total in coal-burning steam locomotive trains	10,399	23,653	83,214	181,253
4-10	Total in oil-burning steam locomotive trains	10,521	19,180	61,599	107,378
4-11	Total in Diesel-electric locomotive trains	221,122	219,549	1,473,245	1,435,521
12	Total car-miles per train-miles	9.77	9.95	9.64	39.00

YARD SERVICE (DATA FROM I.C.C. M-215)

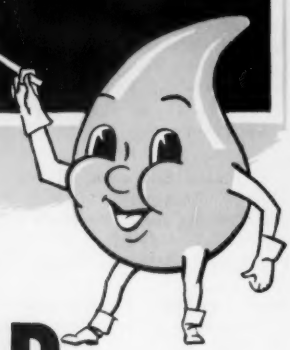
1	Freight yard switching locomotive-hours (000):				
1-01	Steam, coal-burning	296	591	2,219	4,199
1-02	Steam, oil-burning	54	111	378	786
1-03	Diesel-electric[1]	3,297	3,546	22,833	23,927
1-06	Total	3,656	4,268	25,496	29,057
2	Passenger yard switching hours (000):				
2-01	Steam, coal-burning	11	19	88	147
2-02	Steam, oil-burning	5	6	32	46
2-03	Diesel-electric[1]	258	260	1,786	1,794
2-06	Total	300	320	2,091	2,213
3	Hours per yard locomotive-day:				
3-01	Steam	4.70	7.00	4.80	6.70
3-02	Diesel-electric	14.70	16.40	15.00	16.30
3-05	Serviceable	14.20	15.10	14.40	14.90
3-06	All locomotives (serviceable, unserviceable and stored)	12.20	13.50	12.30	13.10
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.72	1.80	1.71	1.73
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	.72	.71	.75	.74

[1]Excludes B and trailing A units.

SHELL TALONA R OIL 40

Fastest growing railway diesel lubricant in the U.S.A.

IN THE TWO YEARS SHELL TALONA R OIL 40 HAS BEEN AVAILABLE, THE VOLUME OF SHELL'S RAILWAY LUBRICANT BUSINESS HAS INCREASED 81%



One Big reason!

ENGINE WEAR

CUT ONE-THIRD

THROUGHOUT the railroad industry Shell Talona R Oil 40 is setting a new standard of anti-wear performance never before achieved or thought possible.

A recent survey on railroads shows that costs for engine cylinder maintenance are reduced considerably when Shell Talona R Oil 40 is used. The average saving was more than one third.

Manufactured from premium base oil plus compatible additives, Shell Talona R Oil 40 offers railroad operators these outstanding advantages:

1. **Superior anti-wear protection**
2. **Excellent detergent-dispersant action**
3. **Outstanding oxidation stability**
4. **Maximum engine performance**

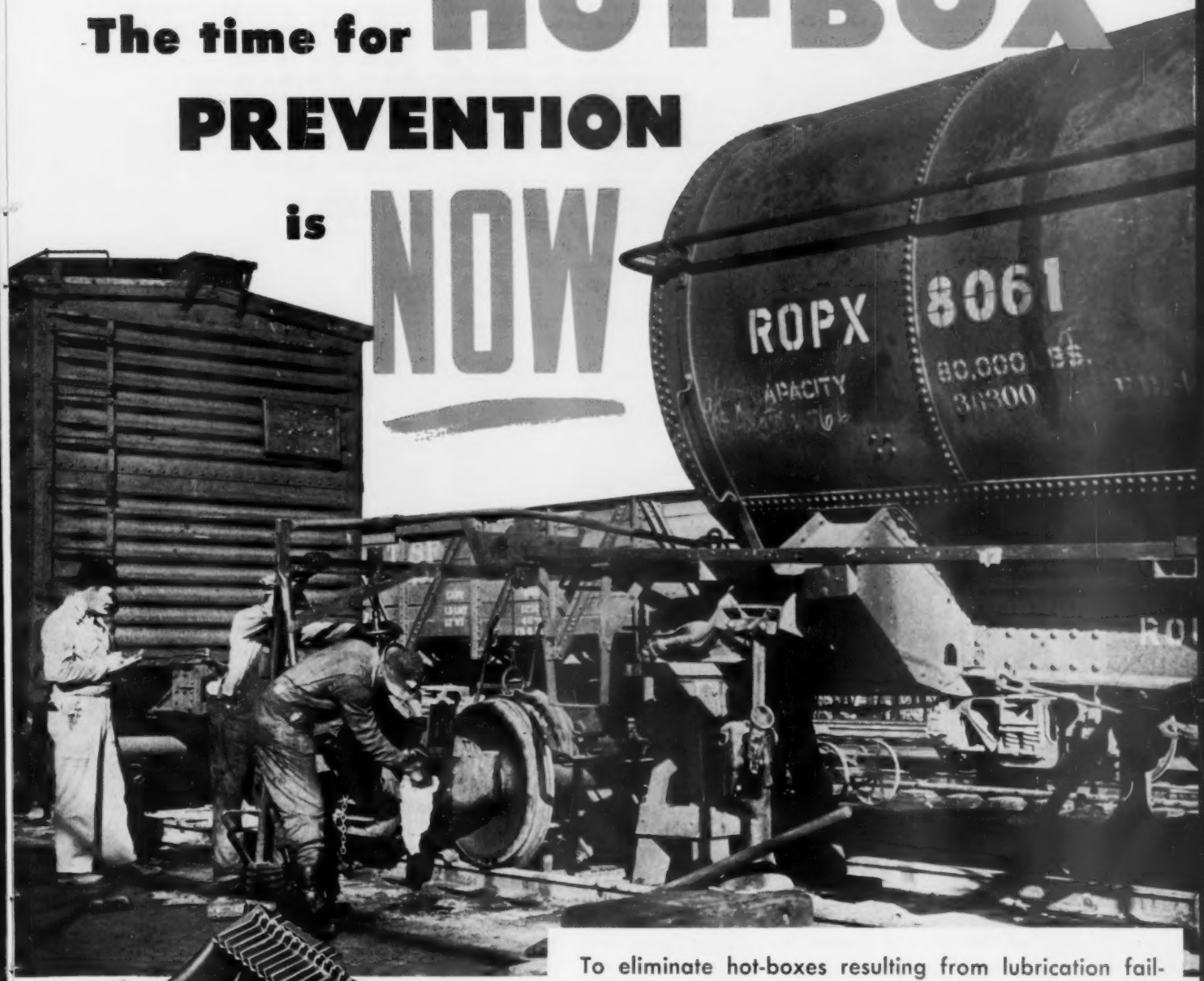
In all types of railroad diesels Shell Talona R Oil 40 is the answer to reduced maintenance costs. See the Shell Railroad Service Engineer for additional details.

SHELL OIL COMPANY

50 West 50th Street, New York 20, New York

100 Bush Street, San Francisco 6, California • Shell Building, St. Louis 3, Missouri

The time for HOT-BOX PREVENTION is NOW



To eliminate hot-boxes resulting from lubrication failures, repack with PLYPAK at any repack period or when cars are shopped for classified repairs, rebuilding, or betterments.

PLYPAK is easily applied . . . slipped into the journal box by hand and set quickly in place with a packing iron.

A modern development, PLYPAK has established a record of proven performance . . . performance so convincing that PLYPAK has been extensively applied by several of America's largest railroads.

Your inquiry invited.

PLYPAK
WASTE CONTAINER & RETAINER

WAUGH EQUIPMENT COMPANY
420 LEXINGTON AVENUE • NEW YORK 17, N. Y.
CHICAGO—ST. LOUIS
CANADIAN WAUGH EQUIPMENT COMPANY, MONTREAL

ASME Meeting

(Continued from page 11)

Operating Experience with Units for Power Generation

Evaluation of Corrosion Resistance of Gas-Turbine Blade Materials.

The Influence of Some Chemical and Physical Factors on the Formation of Deposits from Residual Fuels.

2:30 pm

Gas Turbine Power (V)

Operating Experience on General Electric Gas Turbines.

The Development of the First Gas-Turbine Mechanical-Drive Locomotive.

Railroad (III)—Fuels (VI)

N&W Coal-Fired Steam-Turbine-Electric Locomotive (Design and performance).

THURSDAY DECEMBER 2

9:30 am

Railroad (IV)

Free-Piston Gas-Turbine Prime Movers—A Review of Basic Principles, by A. J. Ehrat, Baldwin-Lima-Hamilton Corp.

Possibilities of Burning Cheaper Fuels in Diesel Locomotive Engines.

Gas Turbine Power (VI)

Structural Design Problems in Gas-Turbines.

Gas-Turbine Bucket Operating Experience and Bucket and Wheel-Design Method.

2:30 pm

Railroad (V)

Realistic Goals for Railway Passenger-Car Design, by T. C. Gray, Pullman-Standard Car Manufacturing Co.

Heavy-Capacity Freight Cars.

ICC Reports on Inquiry Into "Chief" Derailment

The Interstate Commerce Commission has found that a broken equalizer on a car truck caused the derailment of the Atchison, Topeka & Santa Fe's "Chief" at Lomax, Ill., on August 22. The accident resulted in the death of four passengers, and the injury of 41 passengers, one railway mail clerk, and seven dining-car employees.

The "Chief," westbound No. 19 from Chicago to Los Angeles, was traveling 89 mph (the speed limit being 90 mph) when it left the rails at the turn-out of a facing-point crossover. The train consisted of a four-unit diesel-electric locomotive and 13 cars—all of "lightweight steel" construction except the second, that being the car on which the equalizer failed.

That car was a club-baggage car of "conventional all-steel" construction. It was 27 years old, but it had received general overhauling at the Santa Fe's Topeka shops during the first three months of this year.

At that time, the equalizers were removed and a magnetic particle test was made. It indicated no defective condition. On the day of the accident, the train was inspected before it left Chicago, 219 miles east of the derailment point; and "no defective condition was observed."

The commission's report disclosed that the conductor heard ballast striking the bottom of the second car as the train approached Lomax, and that he "started toward the conductor's valve at the rear of the car." The derailment occurred before he reached the valve.

The commission's conclusion (Report No. 3586) as to how it happened was set out in the report as follows:

"Examination of the equipment after the accident disclosed that the rear equalizer on the south side of the rear six-wheel truck of the second car was broken behind the middle journal box location. After this break occurred, the front end of the equalizer dropped downward and became wedged against the side of the journal box.

"The marks on the track structure indicate that the bottom of the equalizer was approximately level with the tops of the

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE OCTOBER ISSUE

FREIGHT-CAR ORDERS

Road	*No. of cars*	*Type of car*	*Builder*
Canadian National	110[1]	70-ton flat	Canadian Car & Fdry.
Chicago, Rock Island & Pacific	100[2]	Box	Pullman-Standard
New York, Chicago & St. Louis	150[3]	Box	Greenville Steel Car
Detroit & Toledo Shore Line	100[3]	Box	Greenville Steel Car
St. Louis-Southwestern	275[4]	50-ton box	Pullman-Standard
Western Pacific	100[5]	Box	Pullman-Standard
	40[5]	Special box	Pullman-Standard

FREIGHT-CAR INQUIRIES

Atchison, Topeka & Santa Fe	250	50-ton flat
	150	70-ton mill type gondola
	500	70-ton drop end gondola
	100	50-ton box
Reading 1,000 70-ton gondola	300	50-ton refrigerator

PASSENGER-CAR ORDERS

Road	*No. of cars*	*Type of car*	*Builder*
Canadian National	2[6]	Diesel-electric	Budd
Chicago, Rock Island & Pacific	25[7]	Baggage	ACF Industries
Southern Pacific	6[8]	Bi-level dome-lounge	Company shops
Union Pacific	35[9]	Sleeping	Pullman-Standard

[1] Approximate cost, $850,000. These are the first 70-ton cars ordered by the CNR for service in Canada.
[2] Equipped with Evans "DF" loading equipment. Delivered in October.
[3] Production to start in two or three months.
[4] Two hundred cars are 40½ ft. length; 75, 50½ ft. Twenty-five of the latter are equipped with Evans "DF" loaders. Total cost, $1,830,000. Delivered.
[5] The 100 cars to have double doors and to cost over $800,000. The 40 special box cars to cost more than $400,000, will be known as "CU & DF" cars, combining cushion underframe construction with Evans "DF" loading equipment and Nailable Steel flooring. Delivery of all cars scheduled for last quarter of this year.
[6] One is an all-passenger car; the other, a combination, mail, baggage and express. The two units to form one Railiner train to replace a steamhauled passenger train.
[7] Approximate unit cost, $29,000. Delivery scheduled for December and January.
[8] Deliveries expected to begin in June, 1955.
[9] Deliveries to begin next summer.

NOTES:

Chicago, Milwaukee, St. Paul & Pacific.—The Milwaukee has been authorized by its board of directors to purchase 74 diesel units to replace all it's remaining steam power. Electrified operation of portions of the line in Montana, Idaho and Washington will continue.

Missouri-Kansas-Texas.—The MKT has authorized the purchase of 500 box cars and six coaches at an approximate total cost of $4,500,000.

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (total)	Cars set off between division terminals account hot boxes			Miles per hot box car set off between division terminals
		System	Foreign	Total	
July, 1951	2,768,920,095	8,886	18,823	27,709	99,929
August, 1951	3,009,371,111	9,023	19,092	28,115	107,038
September, 1951	2,925,570,545	6,472	13,565	20,037	146,008
October, 1951	3,116,490,095	4,131	9,053	13,184	236,384
November, 1951	2,939,503,144	2,022	4,405	6,427	457,368
December, 1951	2,752,316,133	2,130	5,398	7,528	365,611
January, 1952	2,824,298,630	3,208	7,197	10,405	271,437
February, 1952	2,809,162,671	2,723	6,473	9,196	305,477
March, 1952	2,943,812,727	2,594	5,877	8,471	347,517
April, 1952	2,766,313,714	3,826	7,759	11,585	238,784
May, 1952	2,918,508,445	6,020	10,938	16,958	172,102
June, 1952	2,672,512,889	8,466	14,495	22,961	116,394
July, 1952	2,575,298,912	10,566	15,833	26,399	97,553
August, 1952	2,924,917,122	11,658	17,535	29,193	100,192
September, 1952	2,931,129,734	7,536	13,608	21,144	138,627
October, 1952	3,093,990,289	4,058	8,053	12,111	255,469
November, 1952	2,984,101,808	2,198	4,501	6,699	445,455
December, 1952	2,869,928,617	1,742	3,632	5,374	534,040
January, 1953	2,828,906,282	2,219	4,123	6,342	446,059
February, 1953	2,625,563,462	2,111	4,059	6,170	425,537
March, 1953	2,904,227,804	2,696	6,077	8,769	331,192
April, 1953	2,850,752,648	3,383	6,435	9,818	290,359
May, 1953	3,013,610,843	5,892	11,433	17,325	173,945
June, 1953	2,926,001,360	8,537	15,296	23,833	122,771
July, 1953	2,925,317,024	9,342	15,775	25,117	116,467
August, 1953	2,971,020,484	8,638	14,160	22,798	130,319
September, 1953	2,822,222,832	6,083	10,195	16,278	173,376
October, 1953	3,042,558,922	3,863	6,493	10,356	293,796
November, 1953	2,788,773,285	1,987	3,404	5,391	517,301
December, 1953	2,656,063,018	1,581	2,550	4,131	642,958
January, 1954	2,583,485,918	3,082	3,797	6,879	375,561
February, 1954	2,445,214,845	2,953	4,066	7,019	348,370
March, 1954	2,658,757,249	2,196	3,637	5,833	455,813
April, 1954	2,570,518,990	3,079	5,149	8,228	312,411
May, 1954	2,713,511,223	4,416	6,510	10,926	248,353
June, 1954	2,662,375,708	6,597	9,617	16,214	164,202
July, 1954	2,678,234,554	7,956	10,912	18,868	141,946

rails throughout a distance of 6.79 miles east of the point of derailment, and that when the train passed the east switch of the facing-point crossover the front end of the equalizer had worked downward sufficiently to permit the inside surface near the bottom of the equalizer to engage the outside of the head of the south rail of the crossover. When this occurred, the front wheels of this truck became derailed to one side of the rails and the rear wheels to the opposite side."

Struck Cars on Siding—Damage to the crossover's west switch and to the switch of an adjacent siding were found to have caused the general derailment. All of the "Chief's" 13 cars left the rails, and they grazed a string of refrigerator cars which were on the siding. Fourteen of the cars on the siding were derailed or off center. Most of the casualties occurred in the "Chief's" third car, which "turned end for end" after striking the cars on the siding.

The trucks of the car on which the equalizer failed were of the inside swing-hanger drop-equalizer type. The journals were equipped with roller bearings and the spring arrangement consisted of elliptical bolster strings and one helical spring seated upon each equalizer. The car's brake equipment was of the UC clasp type.

The failure of the equalizer occurred 4⅛ in. from the front end, at a point just behind the fillet of the foot section over the journal box. The appearance of the metal at the break indicated to commission investigators that "a progressive fracture had existed for some time." A secondary fracture "showed evidence of rapid development." The old fracture "was in a location in which it could not be detected by routine inspection," the commission report added.

It went on to say that the nature of the origin of the old fracture could not be determined. It also said that laboratory analysis disclosed that the chemical content of the metal met the requirements of Santa Fe specifications.

GM Research Tackles Hot Boxes from Two Angles

General Motors Research Laboratories in cooperation with GM's Allison division have investigated the hot box problem from two angles, lubrication and design. Applying principles proved successful in automotive and diesel engine studies, the researchers have shown how a different oil additive improves bearing lubrication and they have designed a new aluminum bearing. The new bearing weighs eight pounds, or approximately one-third as much as a conventional bronze bearing.

The project began two years ago when A. F. Underwood, head of the laboratory's mechanical development department was asked by a railroad president to find out what help GM's bearings experts could offer toward alleviating this major operating problem. His staff first tested samples of bearing oils, disclosing that: (1) the oil the railroads were using would become thin under ordinary operating conditions, resulting in metal-to-metal contact between bearing and axle; and (2) the "oiliness additive" had little effect on cutting down hot boxes in service. They suggested a different additive compatible with the metals used in a railroad journal bearing.

Concurrent with the additive investigation, work was begun to examine the possibility of substituting an aluminum bearing for the standard bronze model. The data gathered from the GM development work has been submitted to the AAR, which is currently running a parallel investigation on other aluminum alloy bearings.

PERSONAL MENTION

Belt Railway of Chicago

VERNON L. SMITH appointed superintendent of motive power at Chicago.

Birmingham Southern

CLAUD D. COTTON, JR., elected president, with headquarters at Fairfield, Ala., *Career*: Began service with the BS in 1936 as mechanical engineer. Appointed master mechanic in 1946; later becoming, successively, assistant to vice president, and in April 1952 vice-president.

E. E. SANFORD, assistant general superintendent motive power at Decatur, Ill., retired.

Chicago & North Western

GEORGE R. ANDERSEN, assistant chief mechanical officer at Chicago, retired.

H. H. MAGILL, superintendent motive power at Chicago, appointed assistant chief mechanical engineer.

System Lines

W. P. MILLER, assistant superintendent motive power—diesels at Chicago, appointed superintendent motive power.

W. W. MATZKE, chief mechanical engineer at Chicago, appointed assistant superintendent motive power.

E. H. WESTON, assistant chief mechanical engineer at Chicago, appointed chief mechanical engineer.

W. K. FARMER, mechanical engineer at Chicago, appointed assistant chief mechanical engineer.

Detroit, Toledo & Ironton

R. W. WILBER, superintendent motive power and equipment at Dearborn, Mich., has retired.

H. J. OLIVER, assistant superintendent motive power (car) at Dearborn, Mich., appointed superintendent motive power and equipment.

New York Central

F. K. MITCHELL, assistant vice-president—equipment, appointed assistant vice-president—management services at New York.

Equipment Department

(System—Headquarters, New York)

The following appointments were annouced on October 16 by W. F. KASCAL, whose appointment as chief mechanical officer was announced in the October issue, page 8:

S. T. KUHN appointed assistant chief mechanical officer.

A. L. WRIGHT appointed general mechanical superintendent—locomotive, with jurisdiction over territory formerly under general manager—locomotive maintenance.

G. J. FLANAGAN appointed general mechanical superintendent—car, with jurisdiction over territory formerly under general manager—car maintenance.

W. F. COLLINS appointed chief—engineering services.

J. J. GREGORY appointed assistant chief—engineering services.

C. H. KNOWLTON appointed mechanical engineer.

G. T. WILSON appointed assistant mechanical engineer.

R. H. GRAFF appointed assistant mechanical engineer—car.

H. H. DUEHNE appointed assistant mechanical engineer—locomotive.

F. J. KOSSUTH appointed supervisor car maintenance.

A. F. HAGY appointed assistant supervisor car maintenance.

C. L. HALL appointed supervisor—locomotive maintenance.

A. J. RITTER appointed assistant supervisor locomotive maintenance.

R. G. MCANDREW appointed assistant supervisor locomotive maintenance.

Eastern Region

W. C. WARDWELL appointed general mechanical superintendent, with headquarters at New York. Jurisdiction over Line East, Boston & Albany, Canada Southern of Michigan Central District, West Albany, East Buffalo and Avis car shops.

R. F. BATCHMAN appointed assistant general mechanical superintendent—locomotive, with headquarters at New York.

C. M. Craw appointed assistant general mechanical superintendent—car, with headquarters at New York.

R. R. SNEDDON appointed mechanical superintendent at Detroit, with jurisdiction

(Continued on page 90)

The modern Chesapeake uses the modern Diesel

Many of the Diesel locomotives which provide the motive power for C & O trains are lubricated with Gulf Dieselmotive Oil.

and Ohio Railway Locomotive lubricant_

GULF DIESELMOTIVE OIL

Over $460 million has been put into plant improvements since the war to make the progressive Chesapeake and Ohio one of the most modern railroads in America. The modernization program includes a system of centralized traffic control, new mechanical track maintenance equipment, and additional powerful Diesel locomotives.

Many of the C&O's modern Diesel locomotives are lubricated with Gulf Dieselmotive Oil—the modern Diesel locomotive lubricant that contributes to better performance, greater availability, and lower maintenance costs.

Here's why:

1. Effective detergent action prevents harmful piston ring belt deposits.
2. Base stocks are selected for their ability to help prevent hard deposits on the piston crown and in the ring belt area.
3. 100% solvent refining (removing undesirable constituents) insures greater stability and better bearing protection.

Gulf Sales Engineers are as near as your telephone. They are experienced in railroad Diesel operation and are always available to aid you in maintaining high standards of lubrication throughout your system. Write, wire, or phone your nearest Gulf office today for this expert lubrication assistance.

GULF OIL CORPORATION • GULF REFINING COMPANY
1822 GULF BUILDING • PITTSBURGH 30, PA.

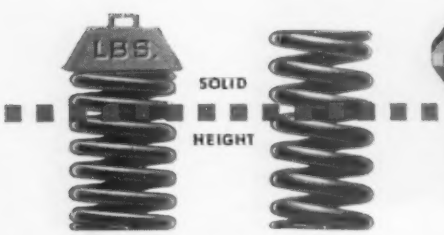
GULF

They're making older

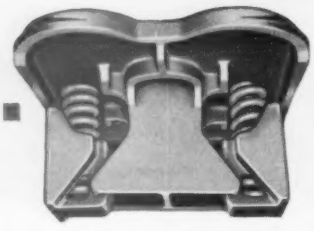
Santa Fe Reefer being brought up to modern riding standards. This car is one of thousands that have been equipped with smooth-riding ASF Ride Control Packages. Installation is simple: just jack up the bolster, pull all the old short-travel springs, slip in the Ride Control Package.

Why a small per-car investment in Ride Control Packages can pay you big returns

SMOOTH, SAFE RIDING AT SPEEDS TO 100 MPH



Long-travel springs . . . for soft, impact-absorbing spring action, whether the car is empty or fully loaded. Your choice of 2½" or 3" spring travel.

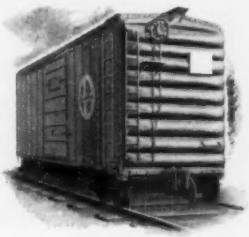


Constant friction control . . . prevents harmonic oscillation of springs. Induction-hardened friction surfaces *keep* it constant —for years of service.

FEWER LADING DAMAGE CLAIMS

The inevitable result of a smoother riding freight car is greater protection of lading —especially when running in modern speed ranges.

LOWER MAINTENANCE COSTS



The car that rides smoother is the car that requires less maintenance and fewer repairs. And, even the roadbed stands up longer!

On the Santa Fe, a continuous program of modernization adds weight to the slogan, "Ship Santa Fe all the way." Here's how

cars ride better than ever!

The Santa Fe repair program offers a good example of how older freight cars can be brought up to modern riding standards—at costs which are soon written off.

During scheduled repairs, the Santa Fe has equipped 4271 reefers and 983 50-ton box cars with ASF Ride Control® Packages, the self-contained units with built-in long-travel springs, *constantly controlled* by induction-hardened friction surfaces.

Standard procedure, as cars are shopped, is to first check the condition of the trucks. If side frames and bolsters don't meet AAR standards, they are replaced with ASF Ride Control Trucks. But in the thousands of cases where trucks are up to standard, the old short-travel spring groups are simply replaced with Ride Control Packages. Time required for the change: less than a half-hour.

Result? Cars that ride better than ever before. *Cars that cut lading claims and cost less to maintain.* In short, here's how a leading railroad is providing smoother, safer freight hauls. And, *repeat orders* for Ride Control Packages prove that the Santa Fe's modernization program is paying off.

Find out how Ride Control Packages can help you keep your older cars in first class condition—and cut lading claims as well. Your ASF Representative has facts and figures on the practicability of making *smoother riding* another objective of any general repairs program. Write us today!

Bring your older cars up to modern riding standards

with

ASF

RIDE-CONTROL PACKAGES

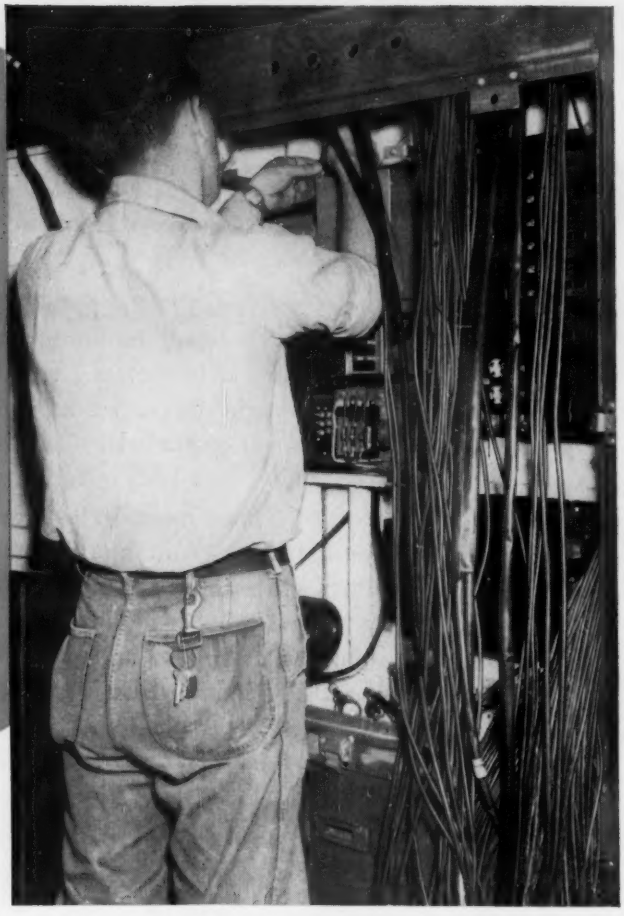
AMERICAN STEEL FOUNDRIES

410 N. Michigan Avenue, Chicago 11, Illinois

Look for this MINT ◯ MARK on the running gear you specify

Canadian Sales: International Equipment Co., Ltd., Montreal 1, Quebec

How to make more passengers ride more often



The more comfortable you make your passengers, the more passengers you will have to make comfortable. The word gets around fast about comfortable, pleasant, train trips. Dependably-operating, comfort-producing equipment like air-conditioning and lighting go a long way towards making train trips enjoyable.

Simplex Car Wire, shown above being installed in a new railroad passenger coach, helps keep this equipment functioning reliably. Able to withstand vibration, and resistant to abrasion, heat, oils, and moisture, Simplex Car Wire is very long-lived.

Its small size and light weight make it especially easy to handle and install. Simplex Car Wire is insulated with a special rubber insulating compound that retains its physical and electrical properties even in wet and/or hot locations. A tough neoprene jacket provides additional protection.

To learn more about how Simplex Car Wire can help you make more passengers more comfortable, by assuring dependable operation of air-conditioning and lighting, write to the Railroad Department at the address below.

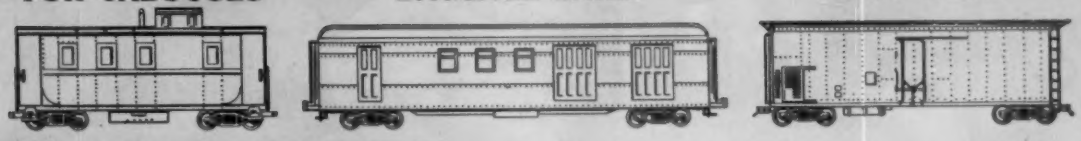
Simplex CAR WIRE

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.

Dana Corporation Announces the New

Small 1/2 to 5 KW Spicer Generator Drive

FOR CABOOSES **BAGGAGE CARS** **FRUIT CARS**



This new Spicer Generator Drive fills a long-felt need for a small, low cost, positive drive to supply power for the smaller generators. It is a simple, light weight, efficient drive, designed especially for use with two-way radio, lighting and other electrical equipment on caboose, baggage, mail and refrigerator cars.

Several years of research and intensive road testing have proved the correctness of design in this small Spicer Drive. It is a fitting companion to the large, time-proved Spicer Generator Drive, of which there are now more than 10,000 in use.

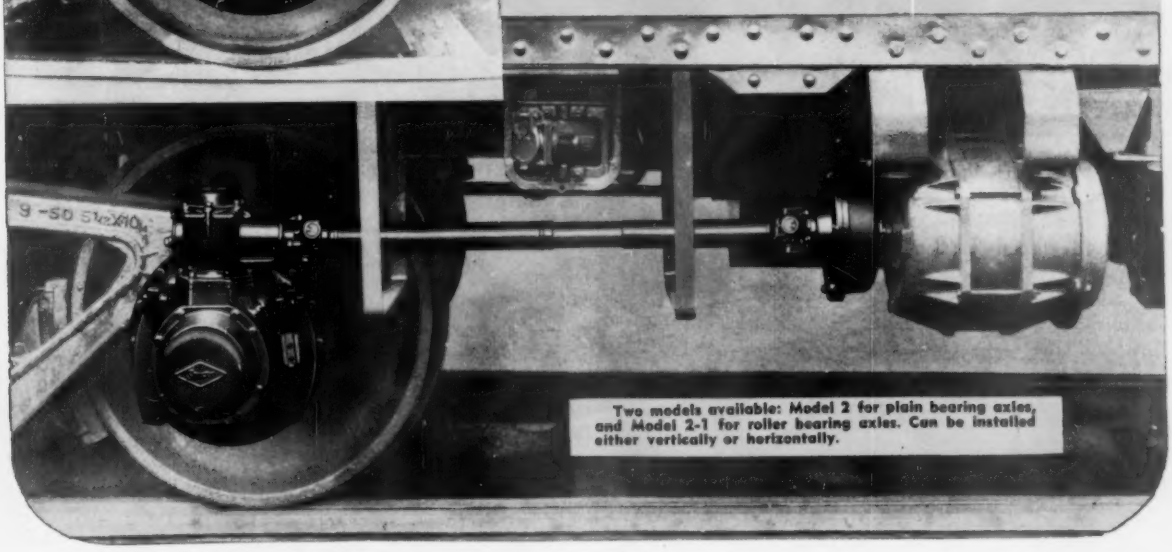
FEATURES

Greater Safety	Quiet Operation
Easy Adaptability	Quick Inspection
Reliability	Low Maintenance
No Belts or Chains	Quality Construction

Attractively Priced

Write for illustrated bulletin No. 323 giving complete details of the new small ½ to 5 KW Spicer Generator Drive.

DANA CORPORATION, TOLEDO 1, OHIO

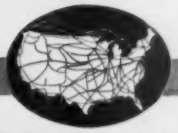


Two models available: Model 2 for plain bearing axles, and Model 2-1 for roller bearing axles. Can be installed either vertically or horizontally.

Ice and infra-red rays

simulated the weather

on the



GREAT AMERICAN RAILWAY
System

Weather wages war on freight cars. In their lifetime most box cars encounter all of the extremes many times as they are shuttled back and forth over the 402,603 miles of track that make up the Great American Railway System.*

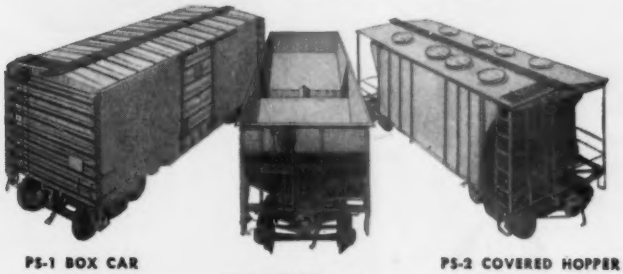
To know exactly how the PS-1 Box Car will perform in cold areas, a sample car is frequently impact tested, in the laboratory, with its welded draft lug and bolster assembly packed in dry ice. To assure superior performance wherever it goes, PS-1 materials and construction samples are proved in accelerated life tests under intermittent sun-like infra red rays and showers of corrosive salt sprays.

These and the many other laboratory findings are augmented by "on line" reports of Pullman-Standard's sales and service engineers. They study the success and failures of all types of construction on cars of all makes. Their reports contribute to the design and building of cars that will successfully meet today's and tomorrow's operating conditions and requirements.

Like the PS-1, the PS-2 Covered Hopper Car and the PS-3 Hopper Car are quality cars efficiently built to produce more ton miles of revenue at the lowest cost per year of service. If you are interested in the modern trend in freight car construction write for booklets describing these cars.

*A typical box car moves, in one year, on 39 different roads, including two or more trips on 24 roads. (A.A.R. data)

Built to serve best on the



PS-1 BOX CAR

PS-3 HOPPER CAR

PS-2 COVERED HOPPER

GREAT AMERICAN RAILWAY SYSTEM

YOUR NEEDS CREATE THE PULLMAN "STANDARD"

PULLMAN-STANDARD

CAR MANUFACTURING COMPANY

SUBSIDIARY OF PULLMAN INCORPORATED

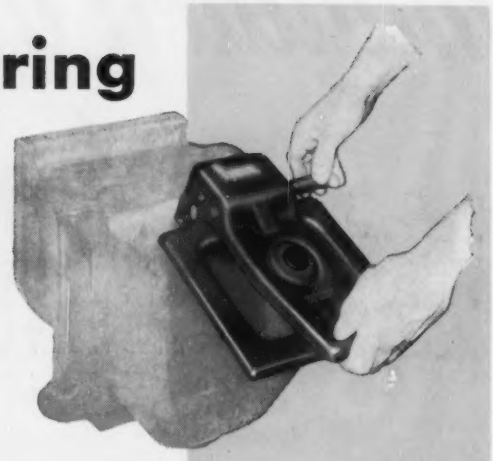
79 EAST ADAMS STREET, CHICAGO 3, ILLINOIS

BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

Rugged, long wearing

MOTOR WHEEL

Journal Box Lids



Attach without the use of tools

1. Full ¾" bearing supports both ends of hinge pin, prevents worn holes, scoring of hinge pin.
2. Stops at ends of bearing hold straight hinge pin in position under spring pressure. NO FASTENING OR HAMMERING REQUIRED TO INSERT OR SECURE HINGE PIN.
3. Keeper pin holds assembly under pressure during shipment or storage. After hinge pin is inserted, hand pressure will remove keeper pin to complete assembly. NO TOOLS NEEDED.
4. Coil spring and roller assembly held snugly by two sheared ears. Roller operates freely over journal box lug preventing wear. Lid opens and closes easily.
5. Exclusive center construction permits full articulation on box face . . . up, down, right or left. Shear riveting and a series of press fits make articulation point oil-tight and permanent.
6. Heavy-gauge full pressed-steel construction.
7. Opens full 120° for easy access to journal.
8. Opening and closing strain eliminated from articulation point by extended housing arm.

Certified by A.A.R. to latest Spec. M-120-47

Standard flange models have all the above features with the exception of the wider flange.

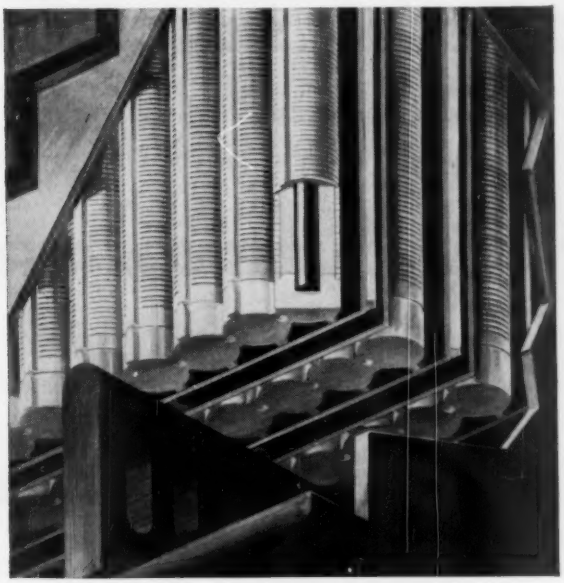
MOTOR WHEEL CORPORATION
LANSING 3, MICHIGAN, U.S.A.

National Railway Sales Representative
T-Z RAILWAY EQUIPMENT CO.
G. S. TURNER, *President*
8 South Michigan, Chicago 3, Illinois

GET DIESELS OFF TO A GOOD START

. . . with dependable Exide-Ironclad batteries!

BIG DIESELS, like this Atlantic Coast Line giant, are equipped with Exide-Ironclad batteries to insure quick breakaway and fast acceleration of engine to firing speed. The battery is built to give a surge of starting power at many times the nominal rated capacity. Positive operation of control equipment is guaranteed. With Exide-Ironclads there is the assurance of uninterrupted "on line" service, high availability of equipment. In addition, lower costs for operation, maintenance and depreciation make Exide-Ironclad diesel batteries your best power buy—AT ANY PRICE!



THE POSITIVE PLATES are the heart of any battery. Only Exide uses a slotted tube construction. By use of tubes, more active material is exposed to the electrolyte, providing *greater power*. Also, more active material is retained, giving *longer working life.*

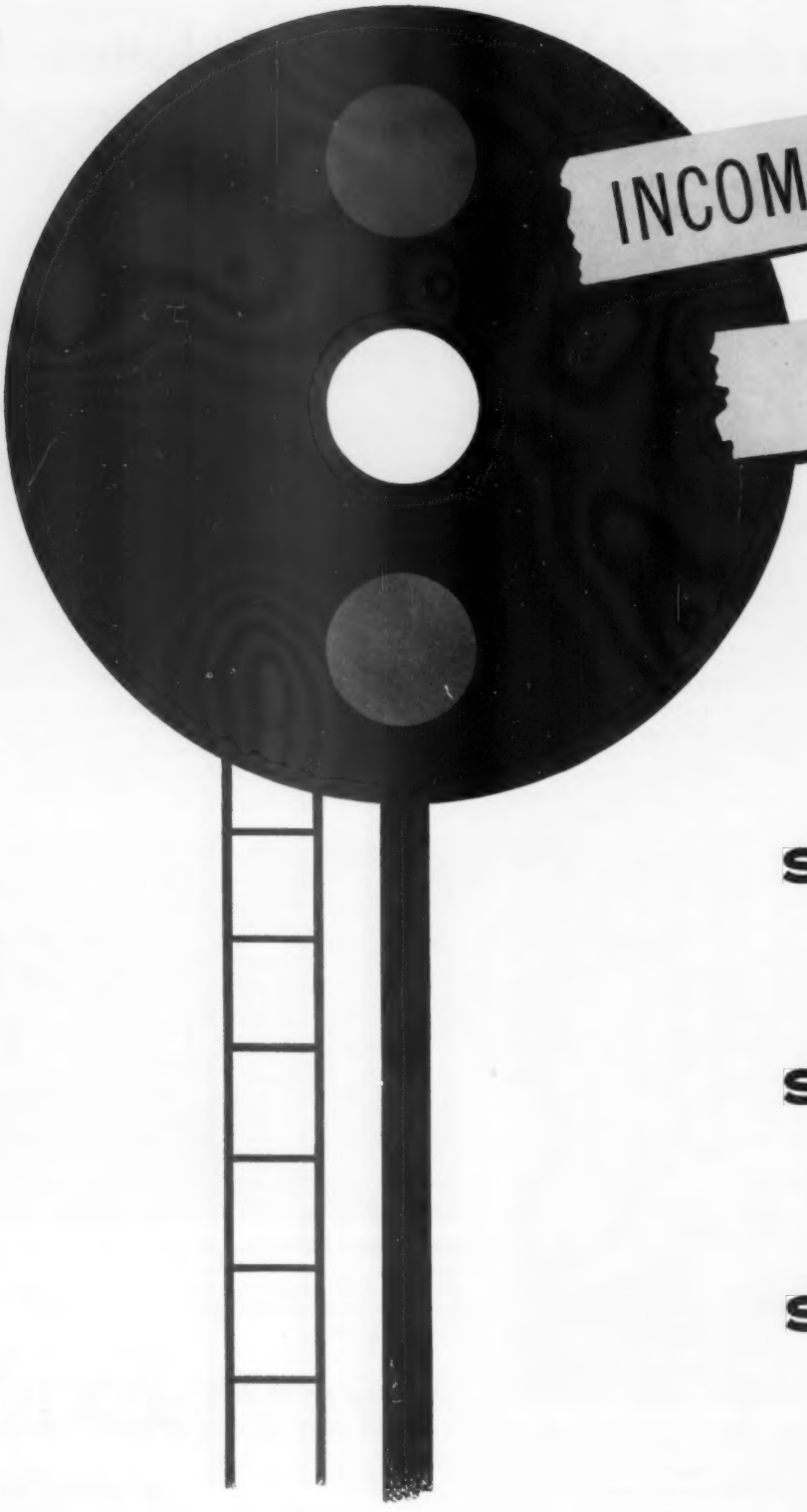
DEPENDABLE POWER, ample reserve power for any diesel need, comes from improved Exide-Ironclads. Prompt delivery. For full details, call your Exide sales engineer—write for Form 4843 (Installation and Maintenance of Diesel Starting Batteries).

Your best power buy
. . . AT ANY PRICE!

Exide®

IRONCLAD® BATTERIES

Exide **INDUSTRIAL DIVISION,** The Electric Storage Battery Company, Philadelphia 2, Pa. • *Exide Batteries of Canada, Limited, Toronto*



INCOMPARABLE...

FOR

SINCLAIR

SINCLAIR

SINCLAIR

SINCLAIR REFINING

SUPERIOR RAILROAD LUBRICATION

GASCON DIESEL OIL

Sinclair GASCON® Diesel Lubricating Oils are used and preferred by more than 100 American railroads. Such a record is as outstanding as the quality of the oils themselves.

JET LUBRICANT TM

More than 70 railroads now use JET. Three years of heavy-duty testing give on-the-job proof that it is best for Diesel traction motor gears.

LITHIUM ROLLER BEARING GREASE

In test after test, this lubricant for Diesel locomotive and car journal roller bearings is proving markedly superior.

COMPANY RAILWAY SALES

NEW YORK • CHICAGO • ST. LOUIS • HOUSTON

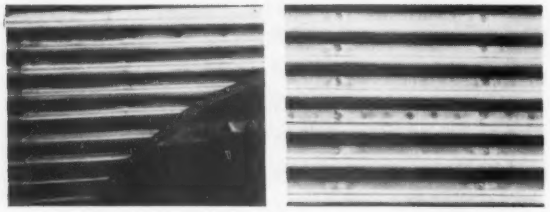
AT THE FRONTIERS OF PROGRESS YOU'LL FIND . . .

AN AIR REDUCTION PRODUCT

In seconds . . . in any position . . . without jigs or back-up plates, this light, easy-to-handle AIRCOSPOT gun spot welds by making contact with only one side of the work.

REPAIR STAINLESS STEEL PANELING *in minutes* with the New AIRCOSPOT GUN!

AIRCOSPOT, Airco's new one-side-only inert arc spot welding gun, takes the time and expense out of repairs to stainless steel passenger cars. Working alone, one man can make thirty welds per minute in stainless sheet up to 3/32-inch thick . . . neat, strong welds that have the job finished before you could even get it started with self-tapping screws, rivets, soft-soldering or pressure spot welding. The AIRCOSPOT gun weighs only four pounds and is nine inches long . . . needs no jigs nor back-up plates . . . takes only a second to make a weld in any type of steel . . . works with any DC power source . . . *without* delicate high-frequency circuits to get out of order. Drop us a postcard for folder and price information.



Compare the stainless steel side panel repair made with slow, old-fashioned self-tapping screw and rivet methods (left) with the neat accurate job done with AIRCOSPOT on a similar panel (right). Because AIRCOSPOT ends drilling and the mess of solder and flux, more and more railroads and car builders are using this fast, sure welding technique in kitchen equipment, washroom facilities, vestibule paneling and other work on light-gauge mild and stainless steel sheet.

AIRCO®

AIR REDUCTION

60 East 42nd Street • New York 17, N. Y.

Divisions of Air Reduction Company, Incorporated, with offices in most principal cities

Air Reduction Sales Company
Air Reduction Pacific Company

Represented Internationally by
Airco Company International

Foreign Subsidiaries: Air Reduction Canada, Limited, Cuban Air Products Corporation

Products of the divisions of Air Reduction Company, Incorporated include: AIRCO — industrial gases, welding equipment, and acetylenic chemicals • PURECO — carbon dioxide, liquid-solid ("Dry-Ice") • OHIO — medical gases and hospital equipment • NATIONAL CARBIDE — pipeline acetylene and calcium carbide • COLTON CHEMICAL COMPANY — polyvinyl acetates and alcohols and other synthetic resin products.

Now! Low cost protection against boxcar infestation...

Economical Johns-Manville Stonefelt (Type K) reduces contamination risks, cuts damage claims

Open corrugations filled with Stonefelt. ▶

◀ Full-size pieces of Stonefelt temporarily in position.

End lining is applied the usual way. ▶

Many costly claims can be avoided by filling the spaces behind boxcar linings where contaminating conditions can exist. When you protect these areas with Johns-Manville Stonefelt® (Type K), danger from insect infestation, corrosion, mold and odor is controlled at the source.

Stonefelt is made of specially treated mineral fibers felted into lightweight batts that *will not settle or shake down.* Strong and durable, its uniform structure of finely divided fibers stops the entrance of insects; acts as a barrier against dust and dirt.

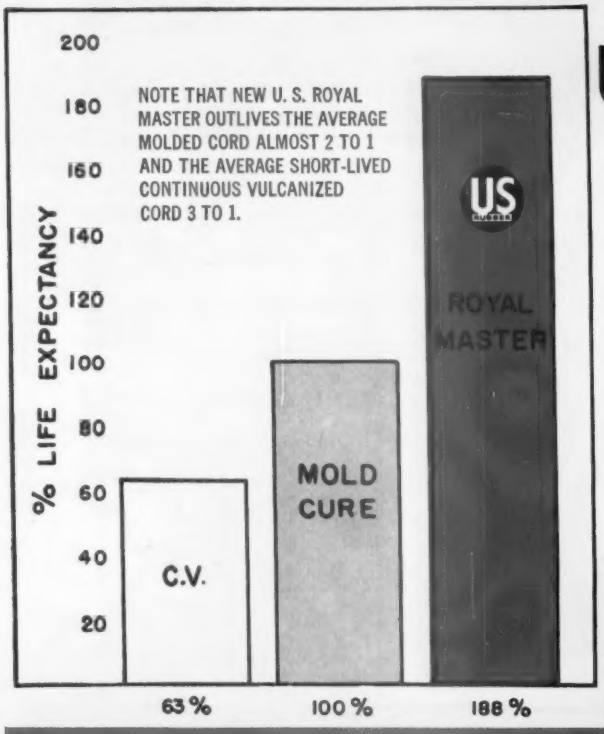
Stonefelt fibers are inert, are not affected by moisture, will not sustain insect life. Virtually indestructible in service, Stonefelt provides continued protection against mold, odors and corrosion.

Stonefelt Type "K" is furnished in cut-to-fit box car sets. Individual pieces are supplied up to 30" x 60" to assure maximum ease of handling. Regular car men can easily apply this material.

Ask your Johns-Manville representative for complete data and samples, or write to Johns-Manville, Box 60, New York 16, N. Y.

JOHNS-MANVILLE JM PRODUCTS **Johns-Manville** 96 YEARS OF SERVICE TO TRANSPORTATION

Now...88% longer U.S. ROYAL



Chart—summarizing individual service factors weighted by their contribution to overall service life—shows new U. S. Royal Master Cord gives 88% longer life than the average of competitive molded cords.

Superior on every count!*

- 33.3% greater heat resistance
- 55.7% greater impact strength
- 53.8% greater abrasion resistance
- 30.6% greater resistance to cutting
- 110.3% greater resistance to tearing
- 21.2% greater tension or breaking strength
- 23.3% greater oil resistance
- 128.8% greater flexibility

*to the average of molded cords of other makes

US RUBBER

UNITED STATES
ELECTRICAL WIRE AND CABLE DEPARTMENT

cord life—with NEW MASTER portable cord!

Far outlasts *any* other cord made!

Service to cost ratings show new U. S. Royal Master Cord actually gives $1.88 in value for every cord dollar when compared to the average competitive molded cord!

Two years ago, "U. S." engineers began a *complete reexamination* of portable cord construction, service life, and the causes of cord failure.

Over 10,000 tests were made. More than a thousand cords of all leading makes, including our own famous U. S. Royal Cord, were analyzed, tested, and compared.

Every life factor was considered and carefully evaluated, alone and in its relation to overall cord performance and service life.

Backed by 64 years of experience in the manufacture of electrical wire and cable, U. S. Rubber engineers then translated their findings into an entirely new portable cord, designed to surpass any other previously made.

Extensive tests, both in the laboratory and in outside plant installations have proved this new portable cord startlingly superior in every respect!

New U. S. Royal Master is unquestionably the finest cord you can buy!

From every standpoint, new U. S. Royal Master is a finer, more durable cord—actually gives 88% longer life than the average of other molded cords—far longer than *any* other cord—surpassing even a *hypothetical* cord incorporating the best features of all those tested!

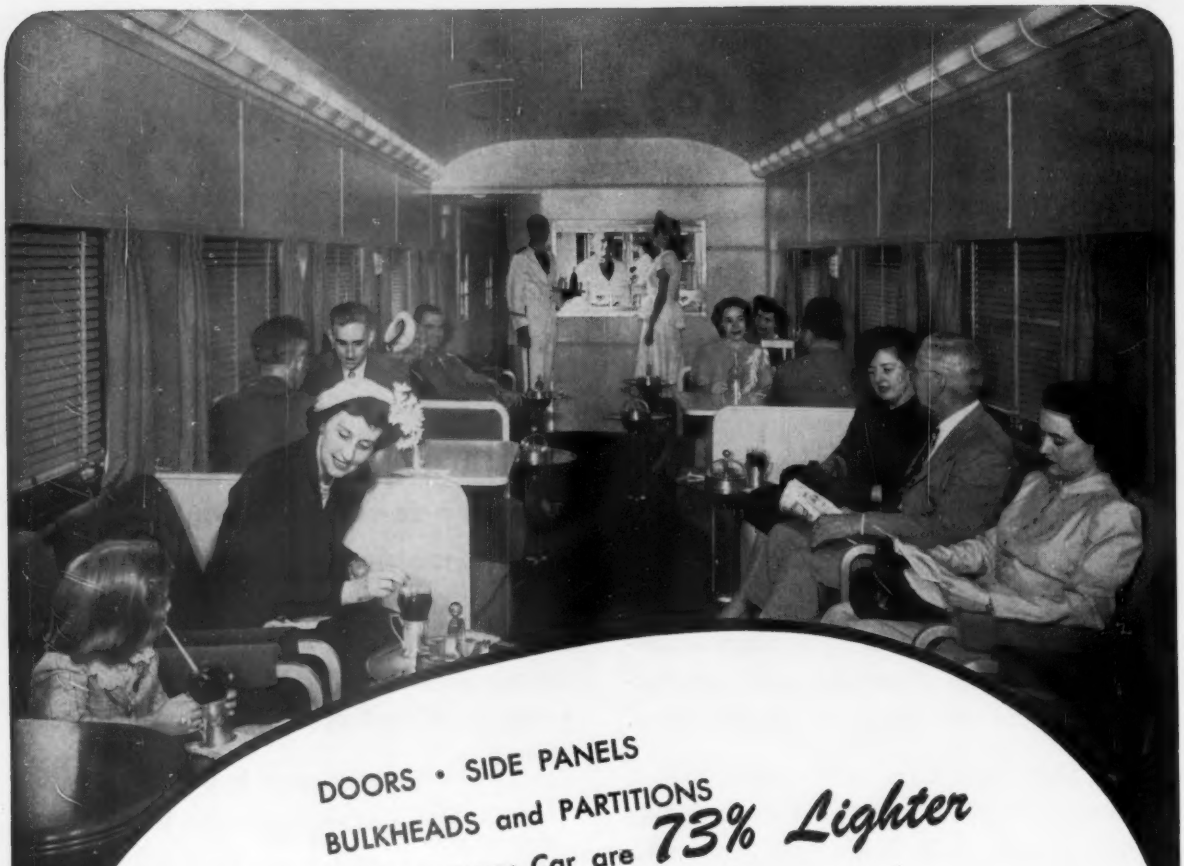
Far greater value, too! In spite of almost doubled service life, this great new cord is in the same price category as other molded cords—giving you $1.88 in cord value for every cord $1.00!

Prove to yourself the outstanding superiority of new U. S. Royal Master Portable Cord—in both service life *and* economy! Get in touch with your "U. S." distributor today!

Approved by Underwriters' Laboratories, Inc.

RUBBER COMPANY

ROCKEFELLER CENTER, NEW YORK 20, N. Y.



DOORS • SIDE PANELS
BULKHEADS and PARTITIONS
in This Luxury Car are *73% Lighter*
Than Standard Steel Construction . . .

...because they are MET-L-WOOD

METAL BONDED TO PLYWOOD

Met-L-Wood, used in passenger cars, locomotives and baggage cars cuts deadweight to a minimum consistent with specified strengths, stiffnesses and durability. As an example, Type 2P2-3/8" Met-L-Wood, used in side panels and partitions has the stiffness of 1/4" steel plate—yet weighs only 2.6 lbs./sq. ft. as against 10 lbs./sq. ft. for 1/4" steel plate!

Whether you require prefabricated Met-L-Wood units to your specifications, or can use stock sizes and finishes, the basic utility and economy of Met-L-Wood for railroad rolling stock construction is worth investigating . . . today. Write for details on your specific requirements. Our engineering staff will gladly assist you in adapting Met-L-Wood versatility to your needs.

MET-L-WOOD CORPORATION

6755 West 65th Street, Chicago 38, Illinois

MET-L-WOOD · *STRONG . . . LIGHT . . . Smooth Finish . . . Sound Deadening . . . Fire-Resisting . . . Insulating*

FOR CLASS 1 PERFORMANCE, SPECIFY

Lewis's

Sealtite railroad fasteners

The nation's great railroads use Lewis Sealtite fasteners. Accurately engineered, designed to do a better job, Sealtite products are tough, durable, made of finest grade metals for heavy duty. They meet the most exacting specifications.

More than 20 years of manufacturing experience have established Sealtite's top quality in the industry. Such famous Sealtite features as the patented fins, for better seating, Sealtite's accurate threading, for easy installation, and many others, have given Lewis Sealtite products a "Class I" reputation in the field.

The next time you specify fasteners, specify Lewis Sealtite, a complete line of first grade fasteners for America's leading railroads.

*One of many leading railroads using Lewis Sealtite products

All Sealtite products are available in HOT-DIP GALVANIZED, SEALED-IN-ZINC finish, which stops rust and corrosion. Tests prove that the molten zinc bath gives Double-Life, greater economy through fewer replacements.

Serving 85% of America's Class 1 Railroads

See your Lewis representative, or contact factory for samples, prices, full details.

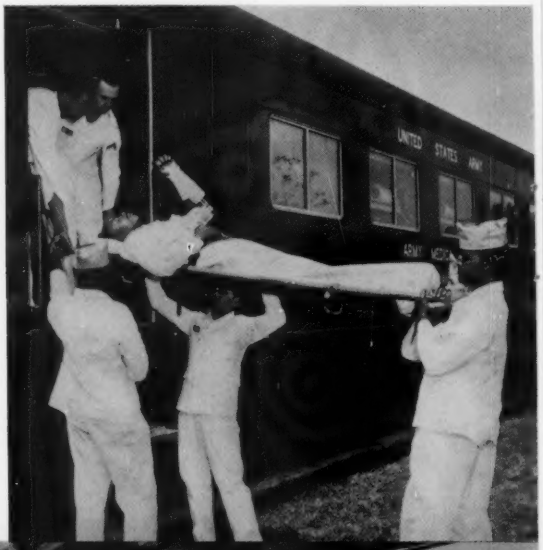
All products are manufactured in the U.S.A. to A.S.T.M. specifications

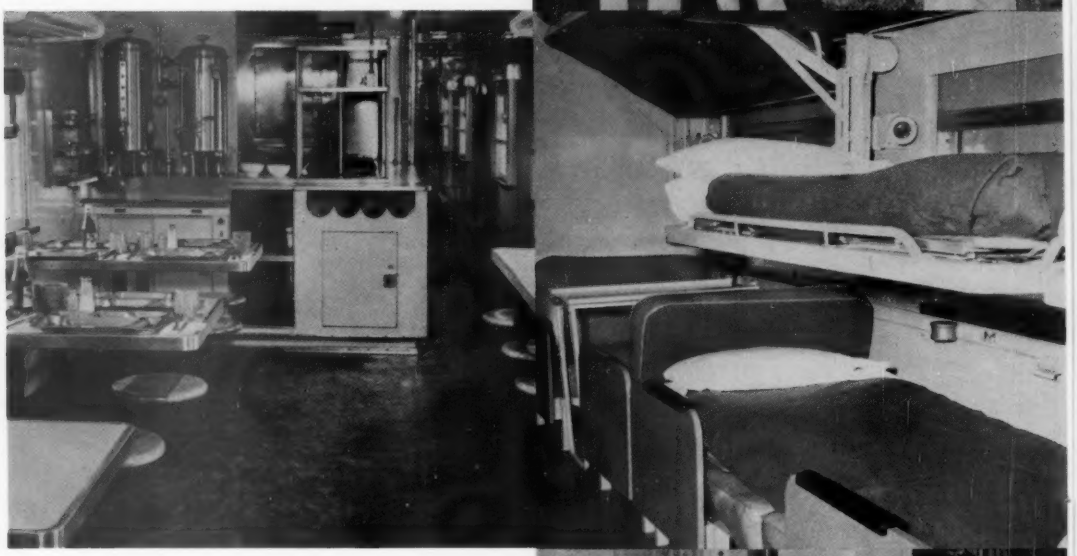
Lewis's **BOLT & NUT COMPANY**
504 Malcolm Ave. S. E.
Minneapolis 14, Minnesota

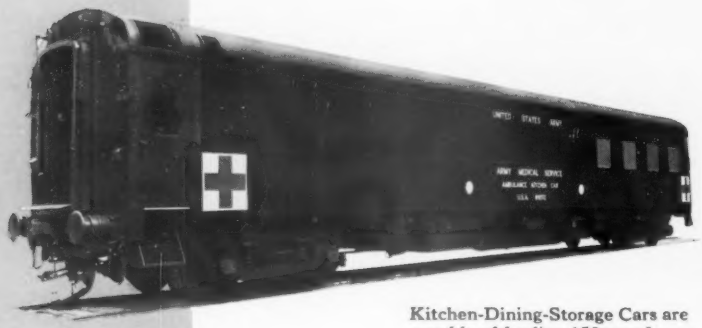
LOOK FOR THIS STAMP OF U QUALITY

Sealtite Bolts available with Loktite Nut #2, washer nut, or std. sq. and hex. nuts.

Ambulance Cars are designed for the comfort of 30 patients







Kitchen-Dining-Storage Cars are capable of feeding 150 people

because they deserve the finest...

ACF, the Army Medical Service, and the Transportation Corps have developed and built a "hospital train of the future." One to bring the finest medical care to our Armed Forces...wherever they might be serving. This Hospital on Rails includes Ambulance, Kitchen and Personnel cars. Completely self-sustaining in terms of light, heat, forced ventilation and water...these cars may be dropped off on a siding for a day or more, with no interruption in the use of facilities. In addition, the cars are designed with special trucks to adjust to foreign rail gauges...equipped with special air brakes that can easily be adapted to foreign vacuum systems...equipped with special couplers and diaphragms to permit interchange with cars used on foreign railroads.

The development of this Hospital on Rails is just another example of how ACF is helping the transportation industry and our country to meet the needs of the future. ACF Industries, Incorporated, New York • Chicago • St. Louis • Cleveland • Philadelphia • Washington • San Francisco.

Personnel Cars will accommodate doctors, nurses, and other corpsmen

acf

CAR BUILDERS

TO AMERICA'S RAILROADS

APPLICATION-TESTED

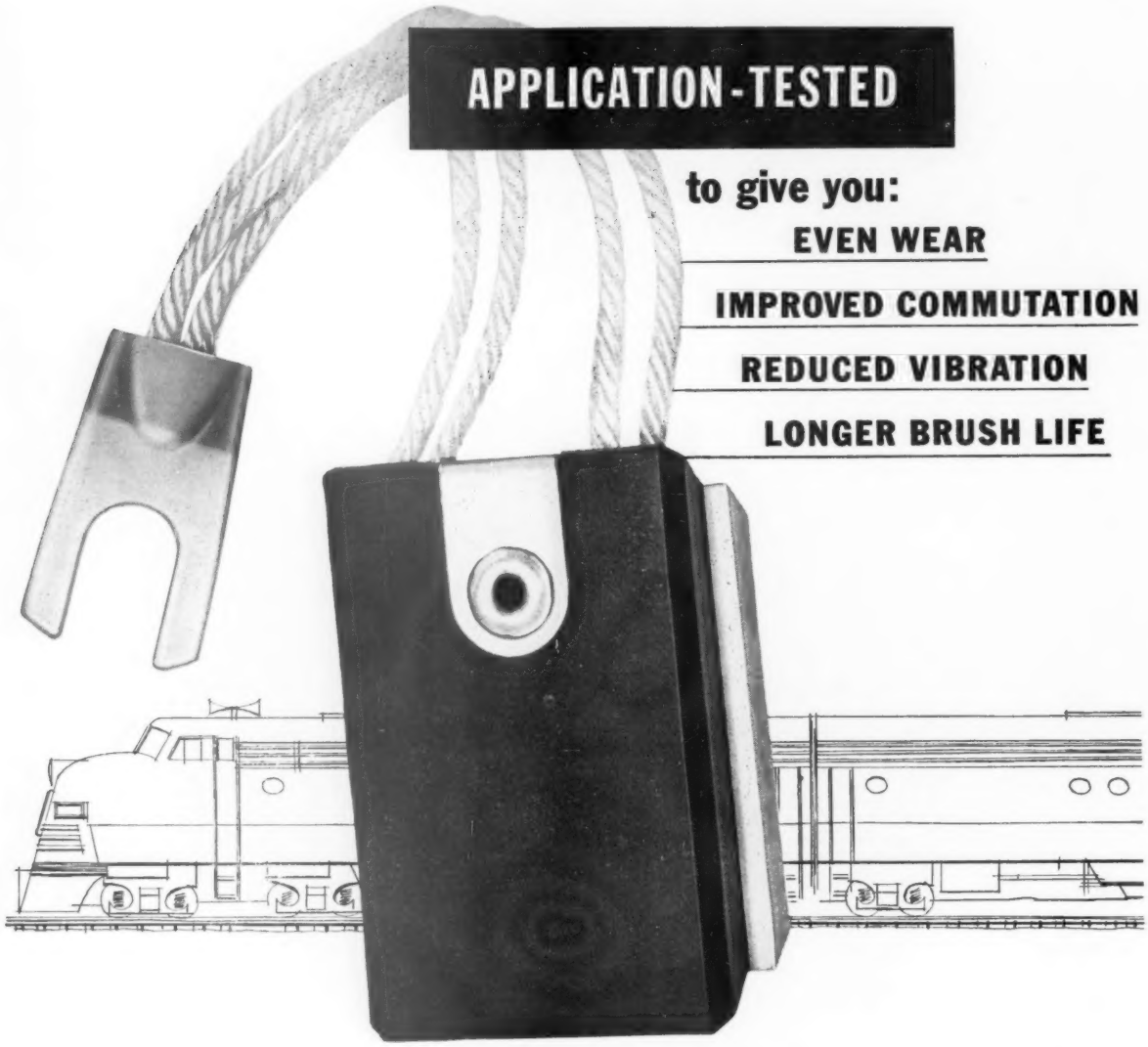
to give you:

EVEN WEAR

IMPROVED COMMUTATION

REDUCED VIBRATION

LONGER BRUSH LIFE



There's a Speer Application-Tested Brush for every railroad use:

Traction Motors • Main Generators • Auxiliary Generators • Motor Generators and Dynamotors • Traction Motor Blowers • Exciters • Fuel Pump Motors

Before it ever goes into production, every Speer brush design is application-tested *two ways.*

First, it is put through hours and hours of laboratory tests. Second, it is carefully observed in thousands of miles of on-the-job operation.

That way, we *know* Speer Brushes will give you the performance you expect.

We know, for example, that Speer MULTIFLEX Brushes – the patented two-section single brushes – will give you double-brush advantages: even wear, improved commutation, reduced vibration. longer brush life.

We know we can say to you, with perfect confidence: Specify Speer.

SPEER *Carbon Co.*

St. Marys, Pa.

Divisions: Speer Resistor
Jeffers Electronics
International Graphite & Electrode

ANOTHER REASON WHY

NATIONAL
TRADE-MARK
BRUSHES
LEAD THE FIELD

IN DIESEL-ELECTRIC LOCOMOTIVE SERVICE

DEVELOPMENT of diesel-electric locomotive brushes — themselves relatively new in application — has drawn heavily on many previous years' experience with brush applications in other fields.

NATIONAL CARBON has consistently paced carbon-brush development in this country. Our original research in the mechanics and chemistry of brush composition — in commutating ability, cable-fraying, wear, friction and mechanical strength, to name a few — has established many of the existing standards of quality for the industry.

This big "difference" in experience is reflected in performance — helps explain the fact that more "National" brushes are used in diesel-electric locomotive service than all other makes combined!

How good is really good brush performance?...
Use "National" brushes and see!

The term "National", the Three Pyramids Device and the Silver Colored Cable Strand are registered trade-marks of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N.Y.
District Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco
IN CANADA: Union Carbide Canada Limited, Toronto

Policies—Old or New?

When a man in public office takes over for a new administration it is sometimes an accepted procedure to make a public statement of his philosophy, political or otherwise, his aims and purposes in the conduct of the new administration and to let his "constituents" know what may be expected from him in the conduct of affairs such as may be of interest to them. The new editor of a publication often finds himself in a not too different situation. He certainly becomes immediately conscious of the fact that after introductions are over he is left to his own devices out in the middle of the stage with eight or nine thousand people waiting to hear what he has to say.

The audience, in this case, is composed of you who read the pages of *Railway Locomotive and Cars*—almost nine thousand of you. Most of you are, or may be interested in the changes that may be expected in a publication that has been coming out month after month for about 1,465 months—in fact since 1832.

Just why, at this moment there comes to mind an advertisement copyrighted by the Cadillac Motor Car Company, that ran in the Saturday Evening Post in 1914, we're not too sure. But what was said in that ad 40 years ago is just as true today—and the Cadillac is the living proof of it. The copy was entitled "The Penalty of Leadership" and there were 21 short paragraphs in the original full-page copy, five of which are borrowed here:

"In every field of human endeavor he that is first must perpetually live in the white light of publicity.

"Whether the leadership be vested in a man or in a manufactured product, emulation and envy are ever at work.

"In art, in literature, in music, in industry, the reward and the punishment are always the same.

"The reward is widespread recognition; the punishment, fierce denial and detraction.

"That which deserves to live—lives."

Even modesty does not forbid the observation that hundreds of thousands of mechanical and electrical men have, over the years accepted the publishing philosophy that has perpetuated this publication. That philosophy has, in part, dictated that every article on whatever subject be as complete in all the details as the reader might need to serve him in his work. There are plenty of pressures these days to throw the standards of the past to the winds and go completely "modernistic."

In the past year reader survey cards have been sent to almost four thousand readers of this publication. Most of you have received one of them. This card is your invitation and your privilege to change the character and the publishing policy of this paper any time you want to. We always have been, and hope that we always will be guided primarily by your wishes. Like a good motor car, the engine may change, the appearance may change, the color may change but only the man who buys it and uses it can, in the long run, dictate changes in its standard of quality.

H. C. Wilcox

A Texaco Railway Representative will gladly help you select the proper traction motor gear lubricant for most efficient and economical operation.

Texaco Crater has been assuring smooth operation and long gear life since the days of the first traction motor gears. Leading railroads report millions of miles of service from their *Crater*-lubricated gears.

Texaco Crater provides a tough, tenacious lubricating film that adheres to the gear teeth and assures constant protection from load shocks and wear. *Crater* stands up in the severest service . . . keeps maintenance costs low.

Texaco Geartac RR has been especially developed to provide longer mileage between servicing periods in new tight gear cases.

Texaco Geartac RR has superior oxidation stability. It has improved characteristics at high and low temperature extremes. It stays on gears, protects teeth against shock loads and wear. Has been proved in service on leading railroads and is approved by leading engine builders.

Just call the nearest Texaco Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis, or Atlanta. Or write The Texas Company, *Railway Sales,* 135 East 42nd Street, New York 17, New York.

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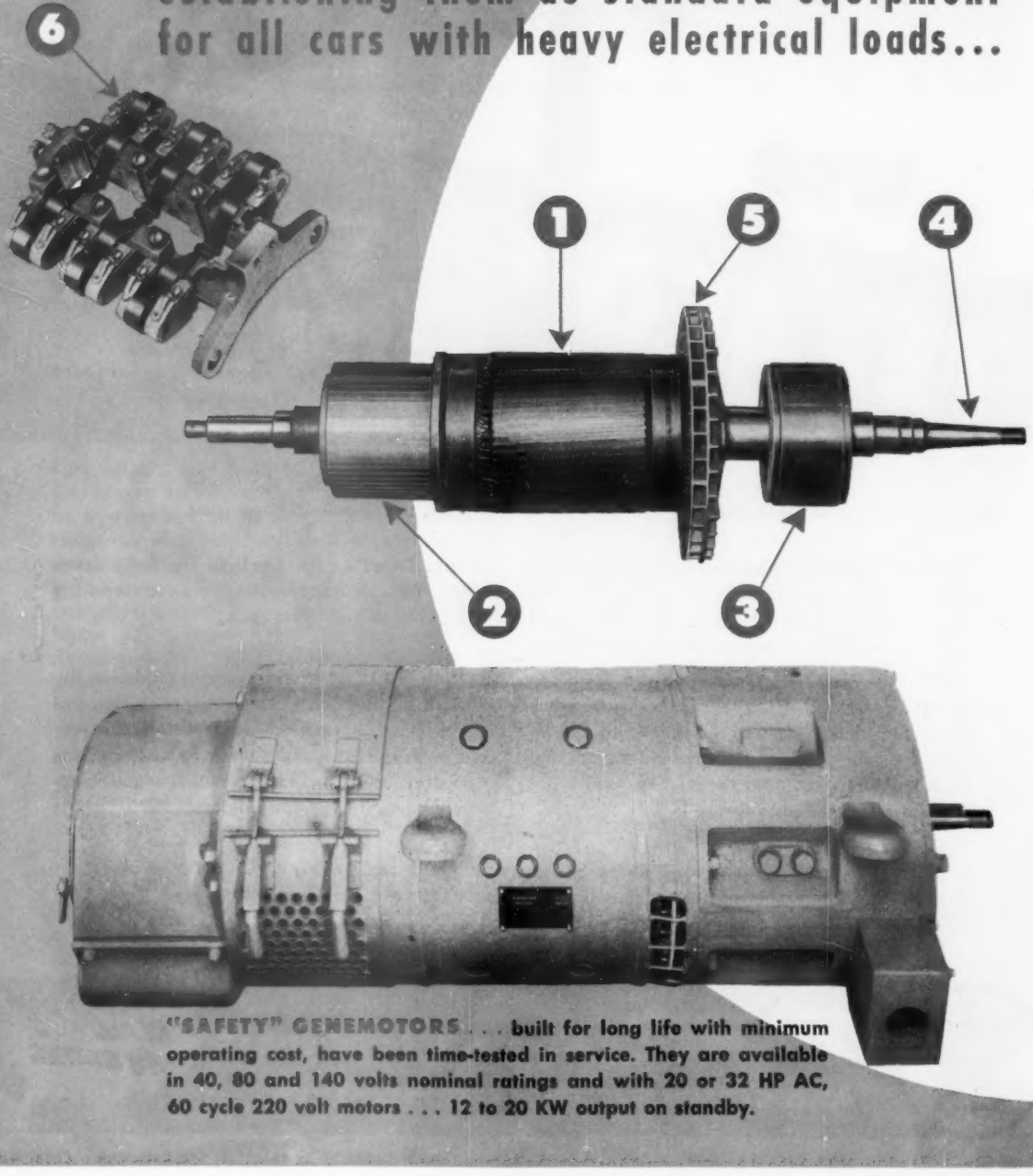
HAVE UNPARALLELED PERFORMANCE RECORDS

establishing them as standard equipment for all cars with heavy electrical loads...



"SAFETY" GENEMOTORS . . . built for long life with minimum operating cost, have been time-tested in service. They are available in 40, 80 and 140 volts nominal ratings and with 20 or 32 HP AC, 60 cycle 220 volt motors . . . 12 to 20 KW output on standby.

CHECK THESE NINE PROVEN DESIGN FEATURES...

1. an armature . . . sleeve mounted and readily removable from the shaft as a separate unit... a standard feature on thousands of genemotors now in service

2. a commutator... with bars of hard drawn silver bearing copper . . . assembled with highest grade mica

3. a rotor, armature and fan...each dynamically balanced individually before application to the shaft, assuring complete interchangeability

4. an armature shaft... of high grade alloy steel accurately ground to size... with keys and keyways held to close tolerances . . . meeting *new* AAR specifications

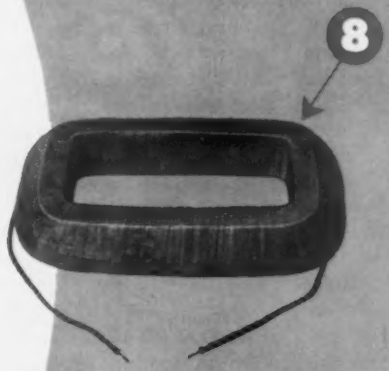
5. a fan... of rugged construction... dynamically balanced

6. brush boxes . . . with spring tension units designed as separate components accurately set at the factory for proper pressure, assuring constant generator performance

7. a polarity changer switch... positive in operation... base hermetically sealed

8. field coils . . . all winding thoroughly vacuum impregnared . . . with added oil and moisture protection

9. AAR specifications... all temperature values — armature, commutator, field coils, interpole coils ...considerably below AAR temperature limits at all operating conditions



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insure dependable and low cost operation

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have been specified for 173 Canadian Pacific and 168 Canadian National passenger cars in their new car building programs

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EDITORIALS

What Railroads Need

Railroads need many things, such as a reduction in taxes, and perhaps more can be done along that particular line than is commonly appreciated. For instance, it was reported in the press recently that an important mid-western railroad is making real progress in its action to secure a major reduction in property assessment for tax-making purposes.

Insofar as equipment is concerned, an increasing number of mechanical officers and car men say that the greatest single need is for a special purpose flat car! Railroads face an intensively competitive situation today and the necessity of satisfying and pleasing both shippers and receivers of freight is self-evident. How can this be done when loading costs are high and shipments are excessively delayed, as happens all too often, especially in the case of lumber loads on flat cars?

While definite figures are not available, it is said that 75 per cent of the open-top lumber loads, originating on the West Coast, have to be set out and sent to adjacent yards or shops for adjustment of end shift. Apparently, some of these loads hardly miss a repair track all the way to Chicago which, in extreme cases, may take 30 days or more. Lumber shippers, generally speaking, are making sincere efforts to prepare open-top lumber loads in conformance with the AAR rules and underwrite whatever expense this entails. Can they be blamed for expecting better service than 30-day delivery on a 2000-mile run?

Flat cars with bulkheads or fixed ends may offer definite possibilities of reduced loading cost and possible shifting of lumber loads due to end shocks in transit. They are better adapted to unit loading which saves labor both in loading and unloading and thus pleases shipper and receiver alike. This type of car presents similar advantages in handling pipe loads and is also well adapted to loading farm equipment and machinery.

Special purpose flat cars are not new in this country. Quite a number of railroads have one or more cars equipped in such manner and in the instance of one railroad the ownership is about 65.

Up to now special purpose flat cars have been used for on-line movement, but favorable experience with experimental loads seems to justify further development of a standard design which may be used with safety and profit in general interchange freight service. AAR studies and action looking to this end are now in progress.

A Barrier to Learning

An electrical engineer recently made a remark that is both enlightening and amusing when he said, "You could have the whole damn mechanical department on one of our passenger trains and if the locomotive broke down the first thing they would do would be to send for an electrician." While the fear of things electrical on the part of the mechanical man is not quite as universal as the preceding remark would imply, there is certainly a hard core of truth behind the statement.

This fear of anything electrical is not confined solely to the non-electrical man on the railroad. It is the same fear that many an automobile owner has who will tear down his engine completely to rebuild it yet be afraid to tackle anything in the electrical system more complicated than a burned-out light bulb or defective spark plug. The problem just happens to be more serious for railroad men because there is so much more electrical stuff today.

It would seem that one of the big educational jobs remaining to be done on the railroad is to overcome this complex that so many people have towards anything having to do with electricity. The same man who will not hesitate to trace out an oil line or water line in a building will tackle the job of tracing out even a relatively simple d-c circuit handicapped by a mental block thrown up by his fear of electricity.

The strange thing is that many mechanical supervisors—probably a majority—can figure these electrical problems out when they have to. But whenever they get the chance they pass them on.

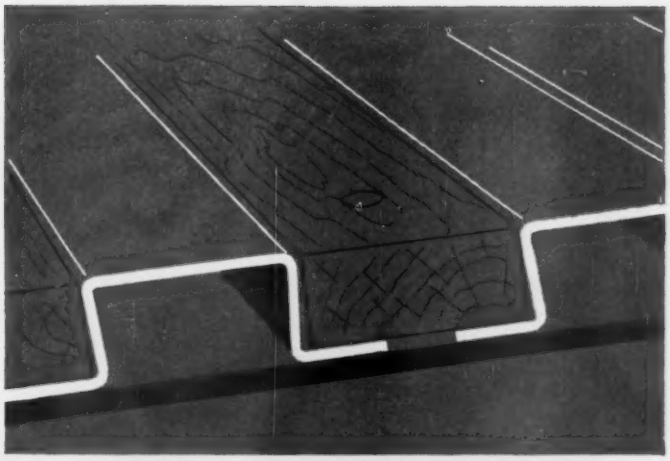
Now, there is much to be said in favor of getting the best talent available to do any job. If an electrician is handy to solve an electrical problem you should certainly get him rather than a pipefitter or a welder, even if the shop rules permitted this alternative. But before the problem arises is it not good sense for the supervisor to equip himself as fully as possible with the basic background knowledge necessary for him to understand what the electrician is doing and to be able to contribute to the solution of the problem? And while the electrician is coming and even while he is thinking about what the problem is and how to solve it, would it not be worth while for the mechanical supervisor in general charge of the work to try to figure out mentally at least what he thinks the trouble is and propose a solution?

This practice in thinking electrical problems through would seem to be good training and education for those cases where he might be stuck with having to actually solve the problem either alone or jointly with a new electrician or some one else not an expert. Building up this background of knowledge and training in thinking along these lines would also help make any supervisor a better supervisor generally for the same reason that a knowledge of machine shop operation is a useful and handy thing for a machine shop foreman to have.

COORDINATED ASSOCIATIONS WILL MEET IN 1955

As this issue goes to press, word has been received that the meetings of the Coordinated Mechanical Associations will be held at the Hotel Sherman, Chicago, September 12, 13 and 14, 1955. In connection with these meetings there will be an exhibit of mechanical products of the member companies of the Allied Railway Supply Association.

WHAT ARMCO FREIGHT CAR FLOORING DOES FOR THIS GONDOLA



Here's an old car with a new Armco composite steel and wood floor designed for today's requirements. Now it can bring bulk loads into a plant, then carry away the manufactured product. This saves time and money in switching empty cars.

Armco Freight Car Flooring is ideal for gondola, box or flat cars—in new construction or in the replacement of wornout wood or steel plate floors in existing cars.

The Armco hat-section steel ribs are made to resist concentrated loads and impacts that would break through wood flooring. They take the high wheel loads of lift trucks in box cars, the impact of clam shell buckets on gondola and flat cars.

Wood Planks for Nailing

Alternately-spaced wood nailing strips permit nailing of skids in the proper way—to a stout wood plank.

Proved in service

In addition, this floor offers operating economy through longer floor life, better protection for lading and less time out for repairs. Five years of service have proved the design of Armco Freight Car Flooring and installation practice to be sound.

For more information on this multi-purpose car floor, write us for the booklet, "Armco Freight Car Flooring" at the address below.

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- ***Precision Finish Boring*** to extremely close tolerances on specially designed machines – another contribution to long, trouble-free performance.
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For complete information, send for your copy of Bulletin No. 6000. Just write a post card or letter to Magnus Metal Corporation, 111 Broadway, New York 6, N.Y.; or 80 E. Jackson Blvd., Chicago 4, Ill.

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Use only **NEW Magnus Bearings for Replacement Purposes**

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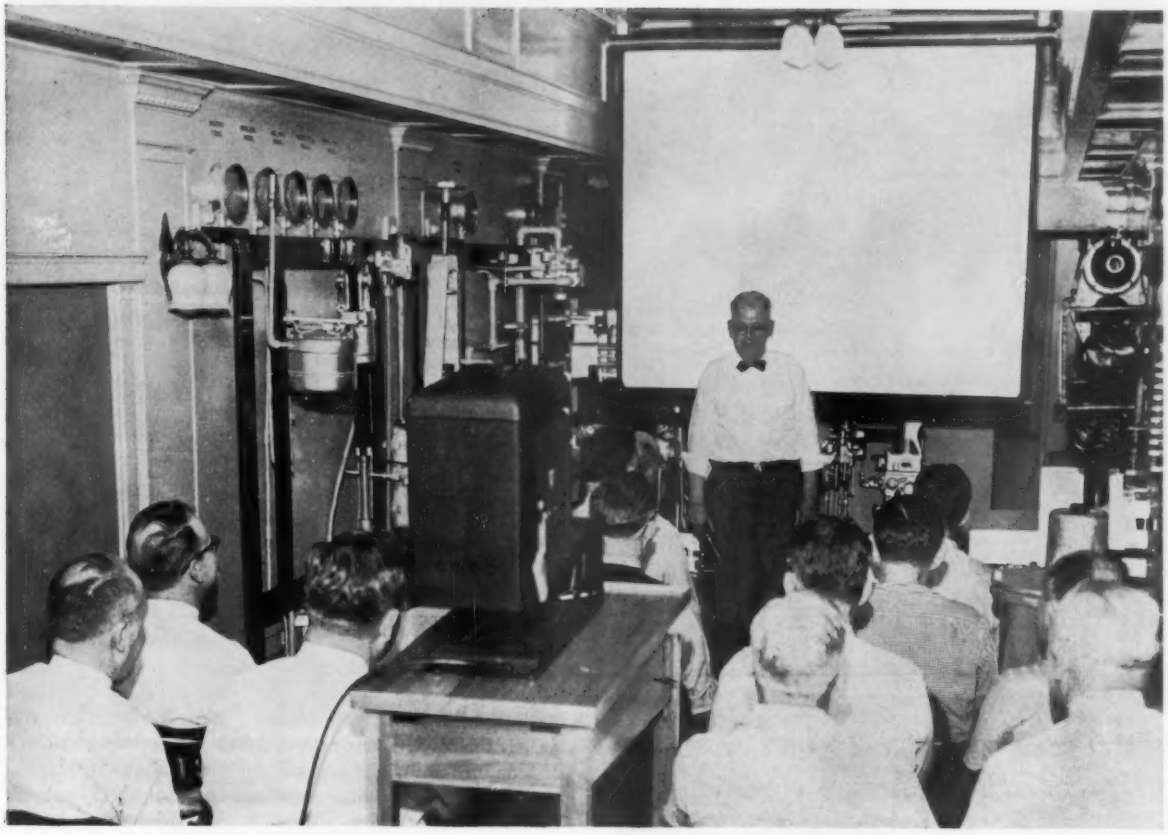
High Mileage

TRACTION MOTOR SUPPORT BEARINGS

...for every type and make of diesel locomotive

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**



Briefing a group before a visual presentation on movie screen. Leading the discussion is Charles B. Stephens, air brake instructor.

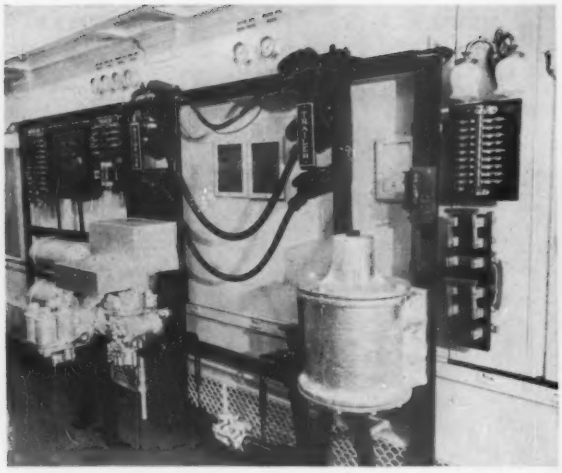
Schoolroom on Wheels

Completely equipped Lackawanna air brake instruction car will visit all main points of railroad twice a year.

THE LACKAWANNA'S newest piece of equipment, a modern and completely equipped air brake instruction car, No. 1954, recently came out of the Keyser Valley shops at Scranton, Pa. The car was designed for the purpose of providing refresher information in air brake operations for enginemen and instruction to prepare firemen for promotion to enginemen through progressive examinations.

Modern in every respect, this classroom on wheels is fitted with a full set of 24RL locomotive brake equipment of the type used on the Lackawanna freight and passenger diesel locomotives. Also installed is air brake and control equipment of the electric and electro-pneumatic type as used on multiple unit electric passenger trains in New Jersey suburban commuter service.

Additional equipment such as AB freight brake equipment with automatic slack adjuster as used on freight cars; Decelostat equipment, an anti-wheel slip device



The multiple-unit brake and electrical equipment installed in the car including controller jumpers for both motor car and trailers.

Complete brake equipment for locomotives, freight and passenger cars is mounted on special brackets to allow instructions to be followed closely.

Multiple-unit controller stand is located in center. At the right is the brake valve used in diesel locomotives. Both operate as in normal train service.

which operates in conjunction with the brake cylinder pressures controlling wheel speed with train speed and prevent wheel slip; an air-sigsal system which is operated through a regular car discharge valve, as is located in each car in a train, to relay signals to the engineer, is also a part of the complete instruction car.

To utilize the advantages of visual instruction, the car has been equipped with a 16 mm motion picture projector and a reflected light device for projecting lantern slides, opaque subjects, sections of printed matter, maps and postage cards on a ceiling suspended curtain type screen.

Numbered 1954, the instruction car is painted in Lackawanna streamliner colors. The unit replaces former instruction car 1951, in which the old type of air brake equipment was use in steam locomotives. The new car was converted from an old air-conditioned parlor car and contains a classroom seating 30 students.

The 24RL air brake equipment as used in diesel locomotives includes a K2A Rotaire valve, a H-24c relay air valve, an automatic brake valve with control release features, a safety control or deadman pedal, an overspeed control, controlled emergency, automatic power cut-off in emergency, safety and overspeed application.

The dynamic brake interlock feature of the control valve prevents the locomotive brake from applying during automatic service brake application when the dynamic brake is being used.

In the multiple-unit section of the car, the M.U. controller and brake valve may be operated either electrically or electro-pneumatically as in actual operation of the multiple-unit cars.

Control jumpers, including the heater and auxiliary jumpers, electric switches and fuses simulate operation as in regular M.U. train service. With these devices, the instructor can demonstrate to the class the proper method to line up the button switches for operating pantographs, dynamometers, lights, heating, control and circuit breakers. After a demonstration, the students take a turn at the controls under the guidance of the instructor.

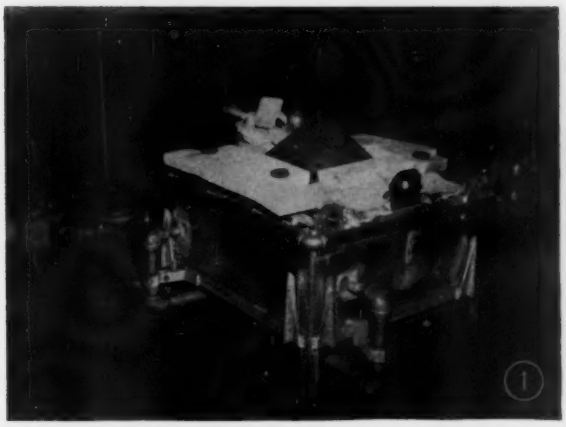
During brake applications on passenger trains, the Decelostat equipment provides a mechanical-pneumatic means for protection against wheel sliding and subsequent flat wheels. It functions automatically when a wheel slip occurs, to rapidly decrease brake cylinder pressure momentarily to a low value permitting the wheel speed to return to train speed. This Decelostat operates in either forward or reverse car movement, and retards the train by preventing the wheels from sliding during braking. Furthermore, it protects the wheels against flat spots.

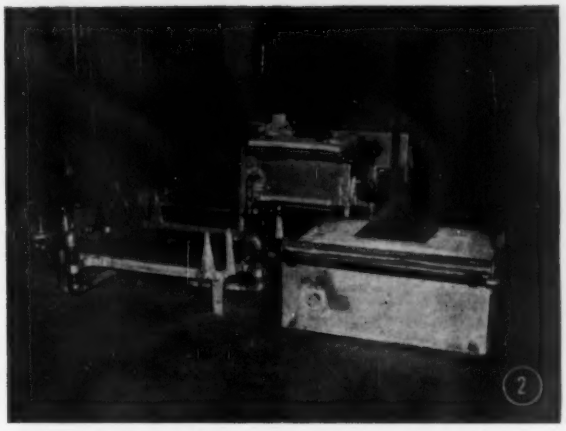
Power supply for the 3 hp, 3 phase, 60 cycle, 220 volt ac motor is obtained from an outside source. The compressed air supply to operate the air brake equipment is furnished by a motor driven air compressor with a capacity of 13.2 cu ft per min, 175 lb capacity. This unit is mounted on a 10.7 cu ft air reservoir located in the front section of the car.

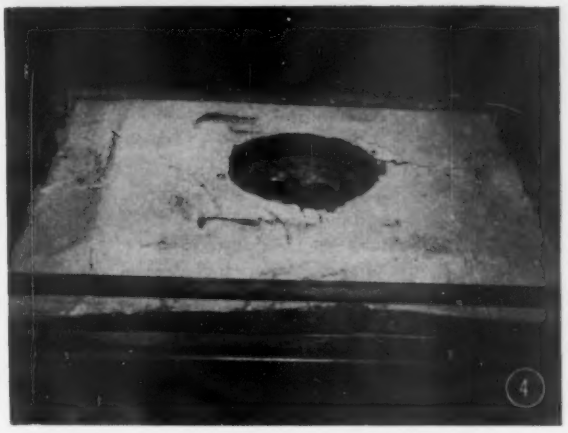
Pipes which connect the various parts of the air brake equipment are painted to conform with the standard color chart for piping arrangement as set up by the air brake manufacturer. This enables the students to more readily and rapidly identify the pipes which lead from one piece of equipment to another.

It is contemplated that the instruction car will visit all

(*Continued on page 54*)







1. One of a battery of furnaces used in welding cylinder heads. The furnace rests on a stand with 9-in. high legs which makes the furnace 26 in. high. This furnace has four burners, one at each corner, so arranged that the burners do not have to be removed when the furnace is lifted out of the stand.

2. A furnace lifted out of the stand. Natural gas is used for fuel and air is furnished by a blower. Each furnace is automatically controlled. The temperature is brought up to 500 deg F in the first hour. The pyrometer is then set to 900 deg F for the second hour, then to 1,400 deg for the third hour. The heat is then turned off and carbon plugs are inserted in the valve seats.

3. Here a welder is welding a head that is down in the furnace.

4. The opening in the lid of the furnace through which the welding is done.

How To Reclaim Cylinder Heads

CYLINDER HEADS to be reclaimed are first placed in a furnace and heated to 1,000 deg F in 3 to 4 hours. After being slowly cooled, the heads are hydrostatically tested for leaks in order to find internal cracks or defects which develop in the heating process. A head which shows defects that cannot be repaired by welding is immediately scrapped before any work is done on it. This eliminates the possibility of welding a head, machining it and then having to scrap it on the final test.

The heating furnace may be a single furnace or one which will accommodate 4 to 6 heads.

After testing, the head is sent to a drill press for machining prior to welding. Three seats are merely cleaned up with a pilot fly-cutter and the other seat opposite the air inlet (where most cracks are found in the head) is cut $\frac{7}{16}$ in. deep with a $\frac{3}{8}$-in. radius round nose tool. The head is then ready for the welding furnace.

A single furnace 37 in. x 44 in. x 17 in. high outside can be used for EMD, Alco or Baldwin heads. The furnace should be lined with insulating fire brick $4\frac{1}{2}$ in. thick. This will give an opening for the heads of $27\frac{1}{2}$ in. x $33\frac{1}{2}$ in. x $12\frac{1}{2}$ in. high. An insulated lid with an opening to give access to the welding area is placed over the furnace after the head is inserted.

The welding is done with a No. 10 tip and a light weight torch, with 14-lb acetylene and 18-lb oxygen pressure. Recommended wire for welding is No. $10\frac{1}{4}$-in.

(*Continued on page 54*)

Trouble Shooting on Rail Diesel Cars

INCLUDED IN A PAPER prepared for presentation at the 1954 annual meeting of the Railway Fuel and Traveling Engineers Association, were the answers to a number of problems relating to trouble shooting with Budd RDC cars on the road. These questions refer to basic equipment which was described in the *Railway Mechanical Engineer*, October 1949, page 543.

A. When engine will not crank:
   1. Check automatic air shut-down valve. Valve must be open and switch closed.
   2. Check battery switch. Must be closed.
   3. Check starter cable. Must be in.

B. When engine will crank but will not fire:
   1. Check fuel in tank.
   2. Check emergency fuel shut-off valve.
   3. Check air intake cleaner for clogged filter, or excessive amount of oil.
   4. Check fuel line for tightness.

C. When engine will fire but stops when reset lever is released:
   1. Engine crankcase lube oil pressure may be below 20 psi.
   2. Engine water temperature is too high.
   3. Transmission oil temperature is too high.
   4. Faulty protective switches; failure of direct drive clutch governor to disengage clutches will stall engines.

D. When engines run but car will not move, with throttle lever in No. 1 position:
   1. Hand brake may be set. Check.
   2. Check for sand on rails. An emergency application may have been made while car was standing, piling sand on rails in front of wheels. Move throttle lever slowly to No. 2, 3 or 4 position to ride over sand.
   3. Check transmission control cable. Plug must be in.
   4. Listen for clutch engagement, one engine at a time.
   5. One of axle gear units may have seized.

E. If engine speeds do not increase when throttle is advanced but remain at idle speed:
   1. Check both isolation switches. Must be in normal position.
   2. Check controller circuit breakers. Must be on.
   3. Check trainline circuit breaker. Must be on.
   4. Check master plug switch. Must be in.
   5. Check engine solenoid circuit breakers. Must be on.
   6. Check engine control cable. Must be in.
   7. Check that automatic air shut-down valve limit switch is closed.

F. When one engine is not pulling:
   1. If the car does not have proper acceleration when the throttle is moved to the No. 4 position, it is an indication that only one engine is propelling the car.
   2. With brakes set and throttle lever in No. 2 position, check whether the faulty engine is running at idling speed or racing at top speed.
      a. The transmission oil level may be low. Check. If oil level is full and pressure gage reads 105 psi when engine is running, isolate engine and proceed on one engine.
      b. The clutch solenoid may be faulty. Move isolation switch to isolate and proceed on one engine. When changing ends to run in opposite direction, return switch to normal position and check whether the engine performs manually. If so, leave switch in normal position. However, if the engine again races at top speed when the throttle is moved to No. 2 position, move switch back to isolate and proceed on one engine.

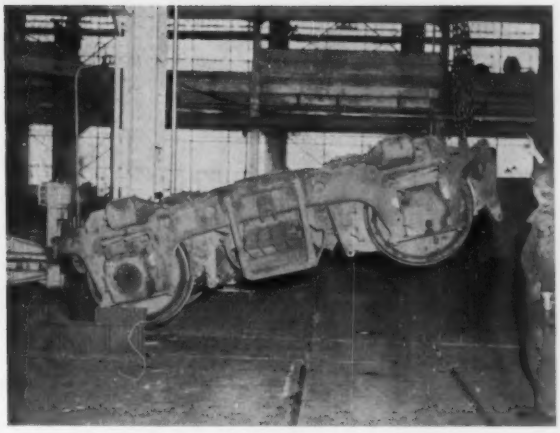
G. Engine runs but stalls when throttle is moved from Off to No. 1 position:
   1. This is caused by the transmission going into direct drive. Isolate engine and proceed on one engine.

H. When main reservoir pressure does not build up or hold. (Note: the air compressor will not operate unless one or both engines are running and master plug switch in cab is in.)
   1. Check air compressor belts. Belt may be slipping.
   2. Check air compressor circuit breaker. Must be on.
   3. Check compressor governor. Remove cover and observe that contacts are closed. Compressor governor is mounted on No. 1 main reservoir support.
   4. Check air-compressor main fusetron.
   5. Check reverse current relay auxiliary contacts of engine that is running. Contacts must be closed.
   6. Check for leaks in air-brake system.

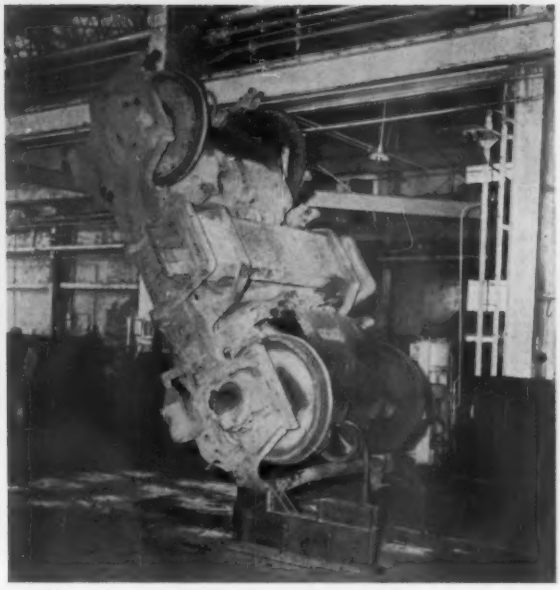
I. When generator will not change with engine running: If generator pilot light is not lit it is an indication that generator is not charging. Check whether the lamp is burned out by observing the pilot light at opposite end of car. If the same light on both ends of car is not lit, check generator main fuse, or, if fuses are OK, check to see that reverse current relay is closed.

J. Operating Car on One Engine:
   1. Should on-the-road trouble shooting fail to re-

(*Continued on page 51*)



Truck with wheels intact being turned over in turnover fixture.



Truck with wheels past center in turnover fixture.

Reclaiming Worn Parts

SOME OF THE DIESELS are reaching an age where wear is beginning to show up at an ever-increasing rate. Parts may be relegated to the scrap pile that could be economically reclaimed. Steps should be taken to make a comprehensive study of these parts to determine the cause, rate and effect of wear and determine the best and most economical manner of their reclamation.

There are three different methods of reclaiming worn parts: welding, metal spraying and plating. Each involves the application of metal on metal. In certain applications, perhaps either of two or three processes could do the job equally well. In an instance of this kind, the most economical method is the one to use. However, the economics of the situation should not result in the acceptance of a greatly inferior method for the end result would be false economy.

Electroplating. In considering all classes of reclamation work, the four major reasons for selecting electroplating are:

1. Application without deformation of the base metal.
2. Application effecting a perfect bond between base and plated metal.
3. Application with a minimum of surface preparation by machining.
4. Application controllable to meet minimum demands of low tolerance parts.

Electroplating is effected with very low temperatures. In the chromium, nickel, and iron plating processes, existing temperatures are well below the boiling point of water, in fact in the neighborhood of 150 deg F.

The type of bond that electroplating effects is a bond of the highest order. Bond tests on electroplated parts have proved that the base metal will rupture before the plated metal separates from the base.

Surface preparation of the part to be electroplated can be kept to a minimum. This is of utmost importance in reclamation work, since the more metal removed the weaker that part becomes structurally.

Electroplating shows up to a great advantage in cases where the tolerances involved are only a few thousandths. Close control made possible with electroplating eliminates the necessity for considerable machine work on the reclaimed part.

Specific Applications. With the advantages of electroplating covered, specific applications of the process to such metals as chromium, iron, and nickel are in order.

Only recently, a satisfactory method of iron plating was developed. It utilizes the purest form of iron possible. Physical properties of this iron are as follows:

Tensile strength	75,000 psi
Brinell hardness	200-210
Yield point	60,000 psi

To date, the largest application for this electrodeposited iron has been to the bores of cylinder liners of extreme oversize. Before this iron is available, the economical limits for re-standard-sizing cylinders by the application of porous or open grain chromium was confined to cylinders that did not exceed 0.030 in. on the inside diameter.

Iron plating is a practical and economical application on just about any wearing surface where the characteristics of iron are suitable.

Two outstanding applications for iron plating that come to mind are with journal boxes and exhaust and intake valve seats. Fretting wear between the outer race and journal box observed at the end of a three year period of operation on a Hyatt roller bearing box ranged from 0.020 to 0.060 in. This amount of wear would necessitate removal from service.

In the plating process, an excess amount of iron was deposited to assure post plate clean up. In this instance, post plate machining was accomplished on a micro grinder.

With regard to worn seat valves, iron application has been made to the seats of the EMD 567 head. Iron plate is deposited on the seats and post plate machining to

Jig for compressing spring plank to remove hanger uses electric motor pump and two rams.

true dimension is accomplished by first reaming and then rough grinding the plated iron. Lapping is effected in the usual manner. One of the strongest recommendations for adopting iron plate as a means of seat reclamation is the fact that no appreciable heat is involved in the plating process to cause deformation of the head, and no more than one hour's machine work is required to prepare the head for service.

The best known application for porous or open grain chromium plating is in oil retentive surfaces, where lubrication of a cylinder liner wall is effected by the reciprocating action of the piston rings and assembly.

Two years ago, one of the larger western roads adopted the use of chromium on the bore of air compressor cylinders. Results have been gratifying and today a number of roads use chromium in this application.

With the realization that chromium resists wear better than any other metal for a wearing surface, a study of parts that would be best reclaimed by dense chromium plating was completed. These parts include: rocker arm shafts, piston pins, blower drive gear, blower stub shaft, governor drive stubshaft, idler stubshaft, idler gear, camshaft stubshaft, wrist pins, and crankshafts.

Truck Repairs. Trucks are removed by lifting the car body off or by the use of a 90-ton table. By means of a turn-over fixture and overhead crane, the truck is inverted and placed on 4 stands 10 in. high after which all stripping operations are performed. The trucks are then transplanted to an outside cleaning vat or sandblasted for removal of all grease, paint, etc.

Springs are reconditioned in the spring shop and brake and spring rigging are sent to the blacksmith shop where grease is burned off and parts are annealed. Bushings and pins are renewed and worn places are built up with electric weld and machined to standards.

The truck frame when cleaned is brought back into the shop and examined for cracks and trammed. Worn places like pedestal legs are built up with electric welding. The frame is then taken to a slotter where the jaw fits are machined to standard dimensions, brought back to the truck shop and again placed in an inverted position and made ready for assembly.

Traction Motor Support Bearings. There are several different ways to reclaim traction motor bearings. Some roads perform total reclamation by welding thrust collars and by spinning in new soft metal linings.

Truck-frame inspection and repair shop where necessary welding is done.

Thrust collars are reclaimed by machining the contact surface at the outer edge of the bearing to give the proper radius to conform with radius at the wheel and gear hub fits on the axle. Metal is machined from the back edge of the thrust collar to allow for application of ⅛ in. base liner applied by countersunk head screws tapped into bearing collar.

In order to develop a method of replacing the worn metal on the thrust collar bearing without machining on special jigs, a modified bearing was developed by a metal bearing company. This bearing is manufactured with a renewable wear ring in the thrust collar of the bearing. When thrust wear occurs and bearings are removed, it is then necessary to replace the ring only.

Main Generator and Traction Motor Bearing Reclamation. Practically all major railroads operating diesel locomotives today have at least one or more shops which includes a roller bearing inspection room. Inspection of bearings is made to determine if the condition of the bearing warrants its re-use.

Where defects are indicated while undergoing inspection, such as pitting of rollers or races or defects in bearing cages, they are handled with the original bearing manufacturer, or in some cases with outside bearing shops for reconditioning. Reclamation by re-manufacture costs about 50 to 60 per cent of the cost of new bearings.

Roller Bearing Journal Box Bearings. When journal boxes are stripped for inspection and repair, particularly when wear liners are to be rewelded and replaced, all inner parts should be removed. These removed parts should be inspected carefully and where defects are found on roller surfaces, the entire set of rollers should be sent to a central shop for further inspection, and size checking to be rematched into sets.

The rollers should be thoroughly cleaned and properly coated with no-oxide compounds, wrapped in VPI paper and stored in matched sets.

Metal Spraying. Metallizing or metal spraying is a process whereby any common metal in wire form is automatically drawn through a special tool or gun to a nozzle where it is melted in an oxygen-gas flame and atomized by a blast of compressed air which carries the metal particles to a previously prepared surface. These particles mesh on the surface of the metal and produces a coating of nearly any desired chemistry.

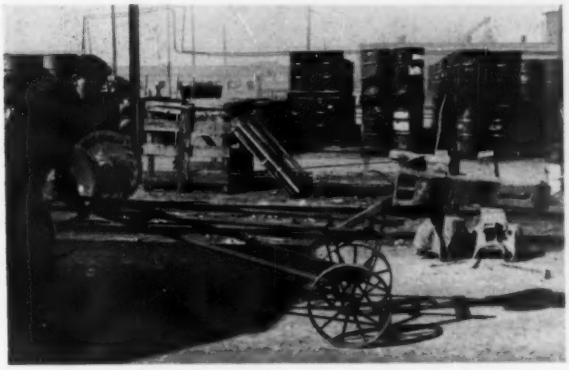
Since the air blast also acts to keep the sprayed surface cool, metallizing is known as a cold process of building up metal parts free from distortion or thermal stress.

Ideas for the Car Repair Man...

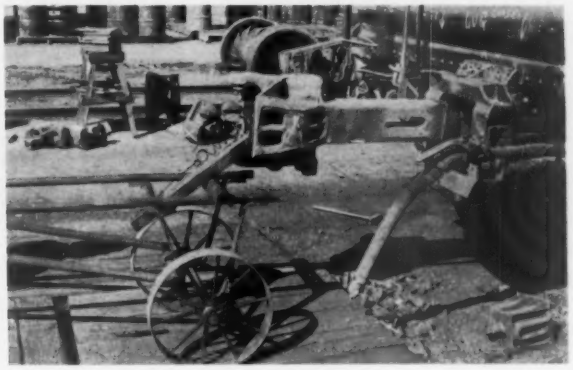
WAGON CARRIES AND HANGS COUPLERS.—A shop-built wagon serves to transport and hang couplers. The part of the wagon which lifts and carries the coupler is attached to the frame by a pin which leaves it free to pivot. This pivoting member is held in position by a spring, and it has two hooks, one on the bottom and one on the top, for holding the coupler. As the wagon handle is lowered, the coupler is raised and held level by the pivoting member.

The wagon is constructed of brake beam struts and 1-in. extra heavy pipe.

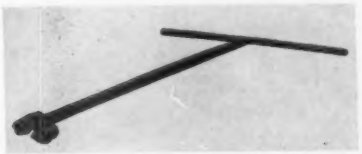
1. Member which lifts and carries coupler is attached to frame by a pin and held in position by spring.



2. When the coupler is raised, the spring is stretched and the wagon carries it horizontal.

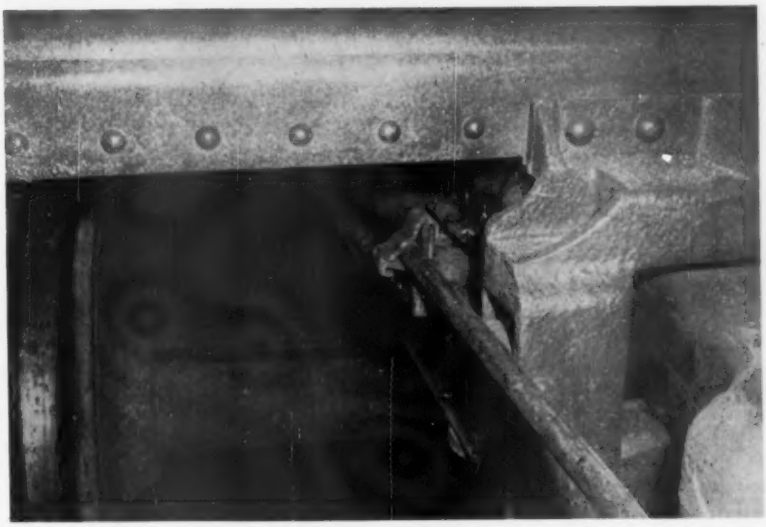


3. At the proper height for applying it directly in place on the car.

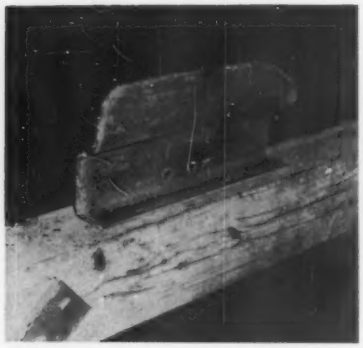


Retainer lock wrench.

STRAIGHTENING COUPLER CROSS KEY RETAINER LOCKS.—The illustration shows a retainer lock straightener which eliminates the need for getting under the car to straighten and remove the retainer. sed on a rip track at Memphis, the device is positioned over the retainer with the workman standing just to one side of the coupler. Turing the T-handle of the wrench straightens the retainer lock for removal.



With the wrench a man can straighten and remove retainer lock without getting under car.



1. The re-enforcement is cut from a scrap corrugated steel end to the size and shape desired, then flanged.

2. The damaged striker casting is left in place and the re-enforcement attached by its rivets.

3. The casting is then pressed tight against the car and welded all around, giving an increased load bearing area.

SCRAP ENDS STRENGTHEN SHEETS AT STRIKER CASTING. When car ends in the vicinity of the striker casting become cracked and weakened, repairs can be made by a method which results in a stronger overall section than original. It can be done with scrap material without removing the broken portion.

The re-enforcement is made from scrap corrugated steel freight car ends, each such scrap end yielding about 30 re-enforcements. This type re-enforcement not only makes efficient use of the scrap steel, but strengthens the area back of striking casting since the corrugations of the re-enforcement mate with those of the end to which it is applied. Thus the load is spread over a greater area of the car end than with the conventional section of angle iron.

When a car end requires repair, the desired size and shape of the re-enforcement is cut out from a scrap end and flanged. The rivets on both the horizontal and vertical web of the existing striker casting are then burned out, but the casting is left in place. Holes are burned in the re-enforcement to match the rivet holes in the striker casting, and the re-enforcement is put in place. It is made large enough to cover car end cracks.

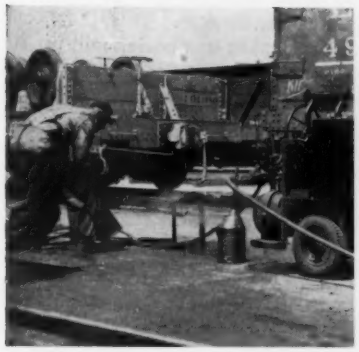
The corrugated end section is pressed cold against the car end with an air jack if available, or by heating it with a torch and sledging it snug against the car end. The new re-enforcement extends to one or two corrugations normally, depending on how much re-enforcement is needed.

Frisco journal-box servicing wagon carries a solvent tank for cleaning the brass, the wedge and the interiors of journal boxes.

When not in use, the rack is carried on top of the wagon, which has brackets for the oil cans and receptacles for parts, paint and tools.

CLEANING AND WORKING JOURNAL BOXES. A mid-western road has built for use of its rip track a wagon which carries all the equipment normally necessary for putting journal boxes into first class condition when required by Rule 66 or wheel renewal. The wagon carries equipment for trimming the brasses and for all cleaning work needed on the journal box and interior parts.

The wagon carries a small tank on



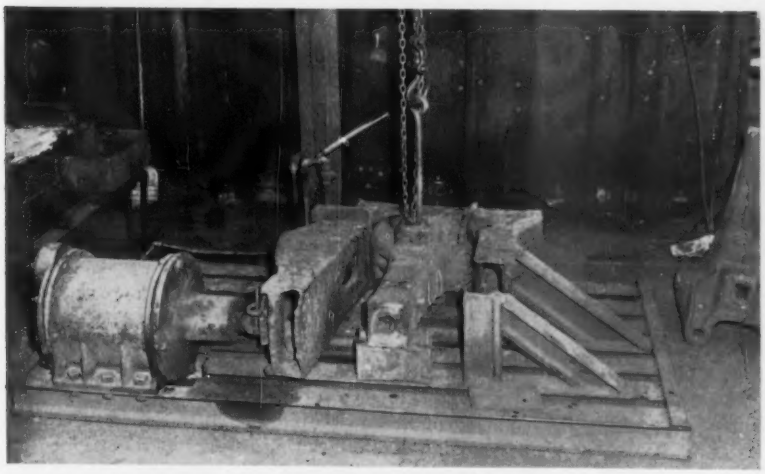
Brasses and wedges are cleaned with a right-angle nozzle while held on a rack with an open top that permits spraying from underneath.

Air pressure furnished from the yard air line at 70 lb through a reducing valve sprays the solvent through a straight nozzle for the box.

one end which contains cleaning solvent. The solvent is delivered through a hose to a cleaning nozzle by air pressure delivered from the yard air lines. The delivery pressure is kept at 70 lb by a reducing valve on the air lines to the tank.

The solvent is used not only to clean the interior of the journal box, but to clean the brass and the wedge as well. For the latter purpose the brass and wedge are placed on a small rack. The top of this rack on which the brass and the wedge rest is composed of four lengths of scrap iron which permit the brass and the wedge to be sprayed from all sides, including the underneath side. When not in use, table is carried on top of wagon.

Equipment carried on the wagon includes a brass trimmer on one end, brackets for oil cans on the top, wooden sounding boards to detect loose babbit also on the top, and receptacles along three of the sides for new and secondhand bearings and wedges, paint, jacks, blocks and tools.



Press for restoring normal contour to coupler guard arms distorted in service.

COUPLER SHANK AND GUARD ARM DISTORTION PRESS.—Coupler guard arms which have become distorted in service can be pressed back to the original contour on a press made from old bolsters and a 16-in. air brake cylinder attached to a bed of rails placed upside down The press also serves to straighten the shank of the coupler.

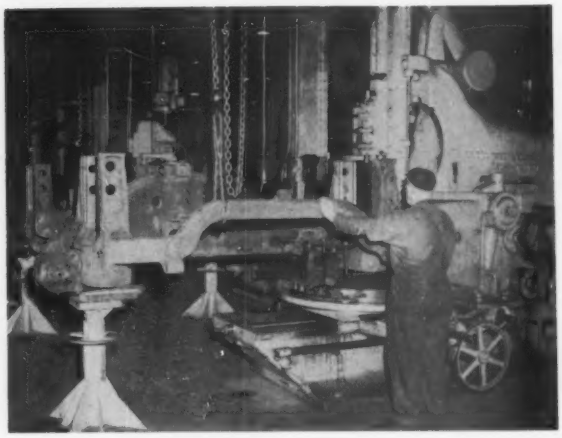
Both shank straightening and the restoring of distorted guard arm to normal contour are done with the coupler heated to 1,550 deg. F.

With the coupler turned around, and a back-up tool placed at the bend, shanks are also straightened.

After final operations by the air cylinder, finish straightening is done with a sledge and forming tools.

STRAIGHTENING BADLY BENT STEEL CAR ENDS.—Severely bent steel car ends can be straightened for re-application on a heavy duty press. The press has a base of 24-in. I-beams, to the top of which scrap rails are welded. The sides and top are 15-in. I beams. The straightening force is applied with an 18-in. air cylinder at 100-lb. air pressure while the car end is maneuvered with the aid of a hand-operated jib crane hoist.

In order to get the worst bends out of the car end the initial straightening operation is done with the aid of a long 4 by 4, the car end being held down by floor jacks and turnbuckles. The latter have hooks at the extremities to hold the car end by its flanges. This, and other straightening is done cold. The ends are heated, however, for the final straightening with sledge and forming tools.



Truck-frame pedestal jaws are slotted after welding. Two cranes are used to hold the unsupported section of the frame.

Reclaiming Worn Parts

(*Continued from page 50*)

On some railroads, metal spraying is generally used for restoring compression fits on locomotive and coach bearing and gear seats on axles, bearing seats on traction motor armature shafts, traction motor housing fits and bearing seats on main generators, crank shafts, cam shafts, fan shafts, and many other items.

High molybdenum alloy wire is generally used as a bonding coat for the subsequent application of other sprayed metals. This wire is also highly satisfactory on all common metals such as steel, stainless steel, monel, nickel, chrome-nickel alloys, cast iron, magnesium and most aluminum alloys. It provides a fair bond to lead, tin, zinc and galvanized iron. It does not bond properly to copper, brass, bronze, chrome plate or Duriron. It bonds to clean glass and ceramics at room temperatures but the thermal shock, due to its high melting point, limits its use in this field.

All sprayed metals tend to contract when deposited and the extent of this contraction varies with different metals. As the coating increases in thickness, the total tensile strength in the coating increases.

This abstract is from a report by an LMOA committee, of which H. S. Bergman, (B&O) was Chairman.

Schoolroom on Wheels

(*Continued from page 46*)

of the main points of the railroad at least twice a year. Classes have already been staged at Buffalo and Elmira, N. Y., on the way to Hoboken on the first cycle of the car's tour. At these classes, the car was used for mechanical instruction as well as air brake instruction.

The instructor has an office at one end of the car. A work bench with the tools necessary to keep the equipment in the car in top notch repair is outside this office.

One of the luxuries provided is the lounge. Here, seats are upholstered and wash room facilities are available for those attending class work in the car. Ice activated air cooling in the summer and steam heat in the winter make the car a comfortable "classroom on wheels."

Cylinder Head Reclamation

(*Continued from page 47*)

Moly-cast iron rod. After welding the lid is completely covered with asbestos sheet and allowed to cool for approximately 30 hours in the furnace.

After the head is cool, it is taken to a boring mill where it is rough machined in the valve seat area. Valve seats are rough machined on a drill press with pilot fly cutter.

The head is then given another hydrostatic test. If no leaks appear the head is then finished machined. This is done on a boring mill where the valve seat area is machined to new head dimensions. The seats are then finished on drill press, being bored and reamed with floating reamer, using a new valve guide and dial indicator to determine standard tolerances. Head is then taken to a surface grinder and opposite side ground square.

The next operation is the removal of the old injector nozzle sleeve, and a new sleeve is applied. The old sleeve is left in while welding so that the hole does not "carbon up" in the welding process.

The head is then given the final test for leaks, after which the joint is lapped in, final grinding of valve seats and assembly of all component parts of the head.

This is an excerpt from a report on reclamation prepared for the Locomotive Maintenance Officers' Association.

Trouble Shooting on RDC's

(*Continued from page 48*)

store an engine to normal service, it is permissible to operate car on one engine. However, acceleration and cruising speed should be reduced.

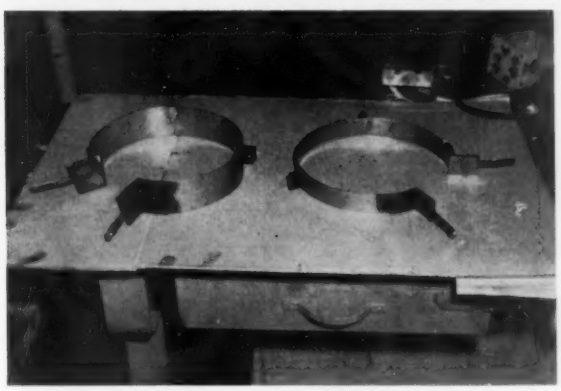
2. In cold weather when car heating is required and engine will idle but will not supply power to drive car, the engine should be kept running in isolate position to supply heat to the car body.
3. It may be necessary to shut down the engine while the outside temperature is such that it is not necessary to drain the system to prevent freezing. Should this occur, the fuse for the heating pump associated with that particular engine should be removed to prevent unnecessary cooling of the engine circulating water. If the No. 1 engine is shut down, remove the fuse for the overhead heat pump and move overhead air-conditioning blower switch to off position.
4. If No. 2 engine is shut down, remove the fuse for the floor heat pump.

Note: If it is necessary to operate car on one engine and there is a possibility of damage due to freezing of engine cooling water, the system should be drained. To prevent unnecessary draining of cooling system, table giving outside temperatures and approximate time required to lower temperatures of cooling water, with pump shut down, from normal to freezing follows:

Outside temperature, deg F	Time required, hr.
35	7
15	5
0	3
—15	1

Ideas for the Diesel Repair Man...

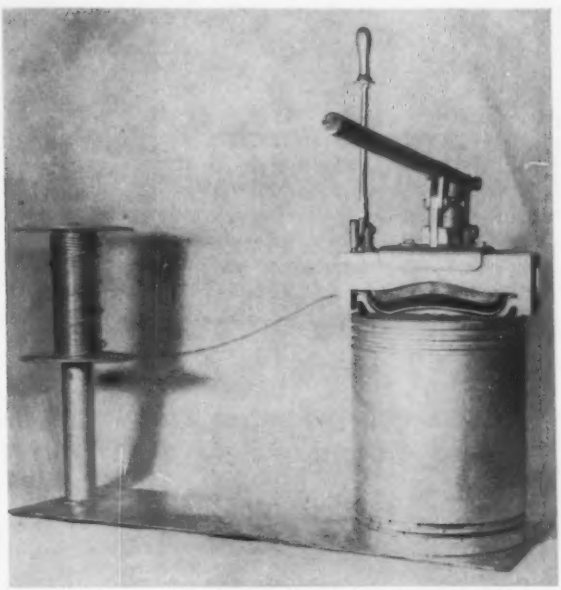
A group of Alco piston rings can be compressed in a half-minute for insertion in the cylinder liner . . .



. . . when handles are substituted for the nut-and-bolt tightening on standard ring compressors

QUICK ACTING RING COMPRESSOR—A simple addition made to Alco standard ring compressors has reduced to about a half minute the time required to compress the rings for insertion in the cylinder liner after their assembly to the piston. The change was made both to the four-ring compressor for the compression rings and to the two-ring compressor for the oil control rings.

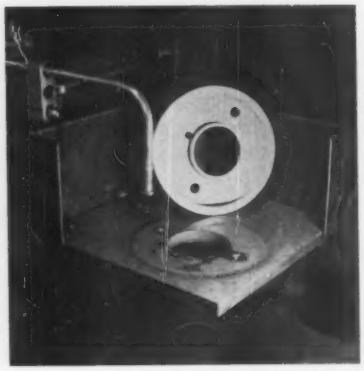
A change consists merely of substituting 4-in. long handles for the nut and bolt which was formerly used to tighten the compressor about the ring. With the handles, the mechanic can squeeze and hold the ring in suitable position with his hands while the liner is being lowered over the piston to complete the power assembly.



Device for forming leads used to check piston cylinder head clearance. EMD 567-type engines.

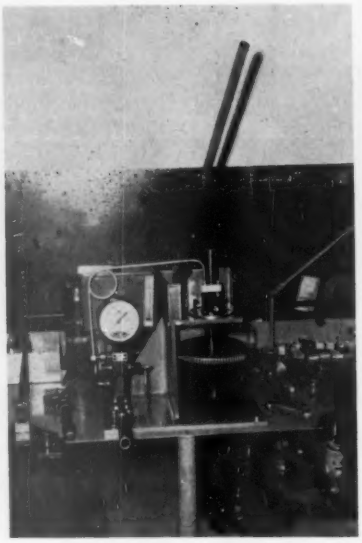
MAKING CLEARANCE LEADS—On each EMD 16-cylinder locomotive on crank case inspection it is necessary to use 16 leads to check the clearances. The previous method of forming these leads by hand took approximately 12 min. for a set of 16 leads. To make 16 leads with this device takes about 2 min. and there is no loss of material.

In one shop it was necessary to find some way of cutting down the time for doing this work and preventing loss of material. The device is made by taking an old standard EMD 567 piston, making a cap to fit over the piston with a slot cut in it to guide lead from a spool into the die where it is inserted up to a stop. Downward pressure on the large hand lever shown forms the lead to the shape of the piston head and operation of the small lever cuts it off. A portion of the piston head is cut away to allow formed leads to fall out on the side.



Heavier, tighter-fitting support plate prevents injector wobble and interference with rack movement.

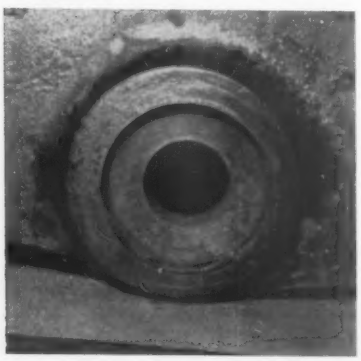
MODIFICATION TO INJECTOR TEST STAND. Three minor modifications made to the EMD injector test stand are shown here. The first consists of substituting a comparatively heavy machined support plate for the stamping which is furnished with the injector tester. The greater rigidity of the heavier support plate plus a injector when in place. This eliminates the interference with the rack smaller-diameter and hence tighter-fitting hole prevents wobble of the movement that previously occurred when the injector became tilted, causing the rack to rub against the test stand during its movement.



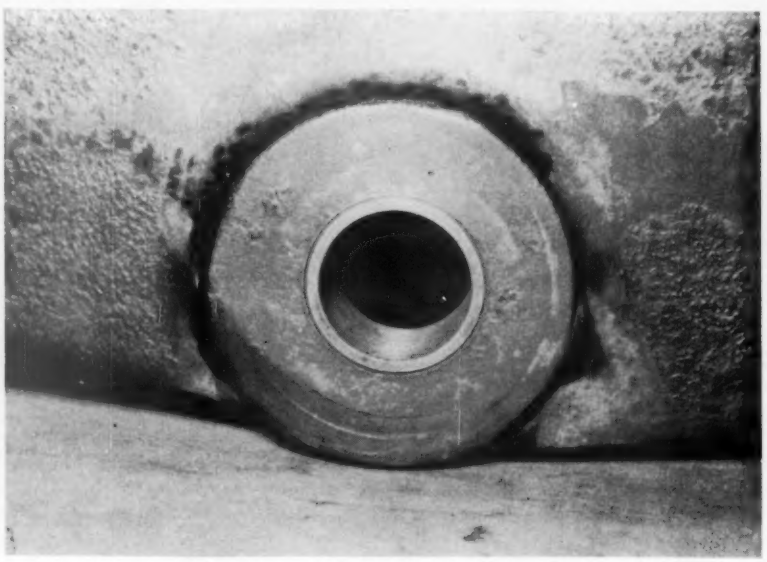
Dished cover on bowl prevents false indication of dribble and oil spillage around outside.

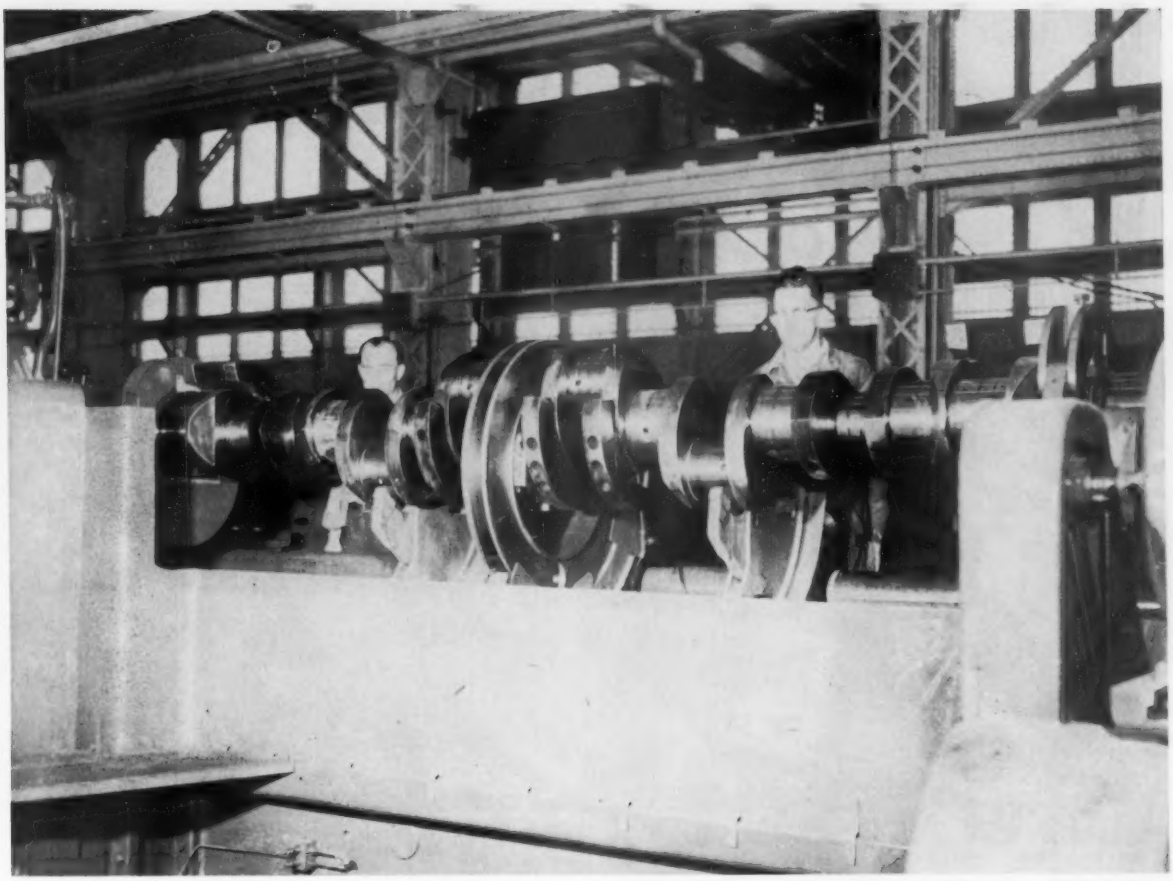
The second modification eliminates a false indication of "dribble" and reduces substantially the amount of oil that has to be wiped up around the test area. This modification is simply a lid that fits over the glass container. The hole in the center of the lid is large enough to clear the injector all the way around so that oil won't collect, run down the barrel, and give a false indication of dribble. The lid is also dished towards the center to drain off any oil that might accumulate on the underside.

The final modification is the installation of a splash guard around the top of the test stand to prevent oil from splashing and spilling around the test stand area.



HOW TO RECLAIM BRAKE HANGERS.—The illustrations indicate how a worn brake hanger may be restored by welding. The upper left shows its condition as removed from the locomotive. At the lower left is the hanger after the worn area has been built up by using a portable, shielded, consumable electrode head, using 1/16-in. silicone bronze wire. The finished hanger is shown below.





How the NYC Grinds Diesel Crankshafts

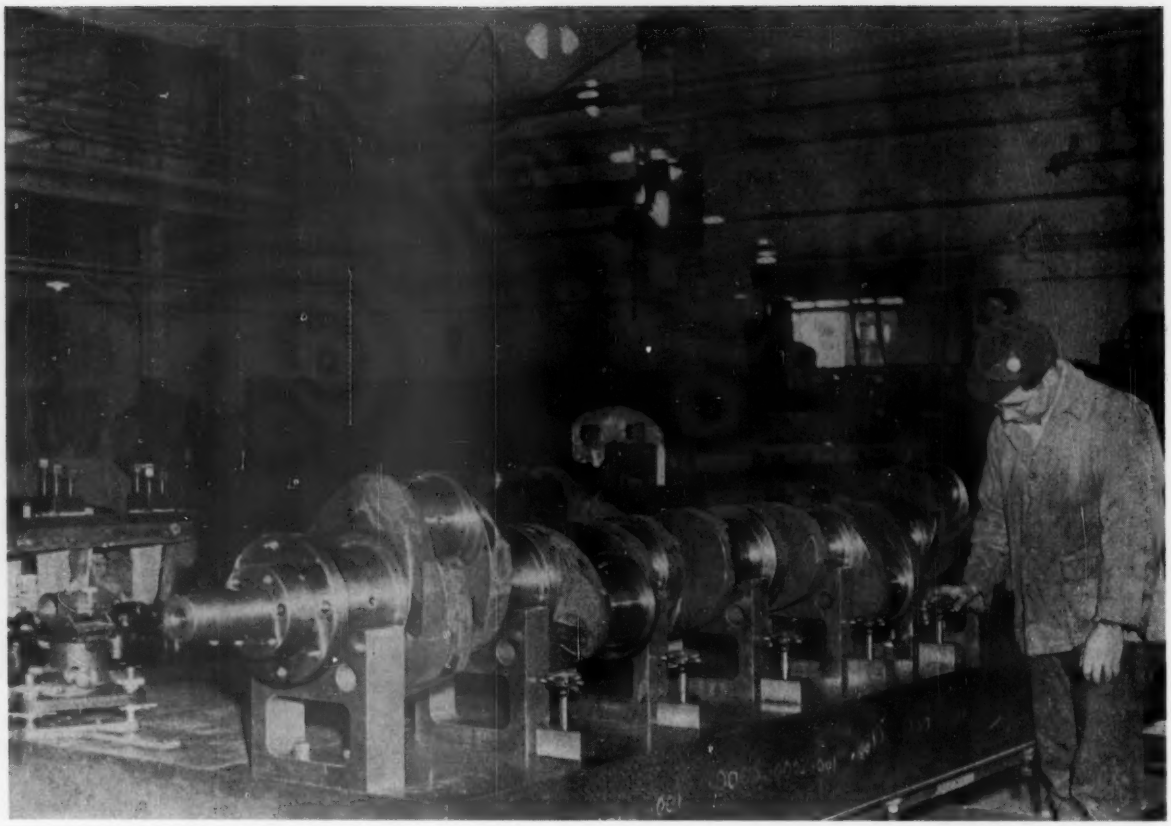
Crankshafts for entire system handled on one machine that does the job in 40 to 82 hours depending on engine type

FOR MANY MONTHS the New York Central has ground diesel locomotive engine crankshafts on a Landis crankshaft grinder at the Collinwood, Ohio diesel back shop. Experience on that road indicates that a crankshaft may have to be ground occasionally for wear or being out-of-round but that roughly three-fourths of them will require grinding because of scored bearings and one-fourth because of heat checks.

Both main and crankshaft bearings are ground undersize in $\frac{1}{32}$-in. steps to the standards recommended by each builder, with a maximum limit of $\frac{1}{8}$ in. undersize. If only one bearing requires grinding, current instructions call for grinding all bearings of the same type to the same size, (e.g. grind all throws or all mains the same amount undersize). Well over 90 per cent of the time, however, both the main and the throws have to be ground because the condition which scored the throws also bowed the shaft .008 to .010 in. and grinding is required to restore the correct alinement.

When grinding the shaft to restore alinement, the generator and the free end flanges are also ground to restore the plane of their surfaces perpendicular to the center line of the shaft. For removing the one or two thousandths from the flanges the side of the wheel is used.

The regrinding process unbalances most shafts to some extent, and all are therefore re-balanced after grinding, using a Bear dynamic and static balancer, an operation which takes about two hours. Other inspections given are Magnagloing before and immediately after grinding, and visual inspection for heat checks, patterns and dimpling.



Crankshaft bow is checked more accurately on this layout than on a lathe where the sag gives false indication.

Builder's instructions are followed on the allowable depths and concentration of these three items.

How The Work is Done

Shafts are ground on dead centers at 15 r.p.m., polished on live centers at either 30 or 80 r.p.m. The lower speed is used when polishing on the grinder to avoid vibration and possible wear and misaligning of the machine. Most polishing, however, is done on a 30-in. engine lathe where the shaft can be revolved at 80 r.p.m. The higher speed is permissible when polishing on the engine lathe as this machine is used mainly for polishing. Thus, any slight wear or mis-alignment would not interfere seriously with the use to which the machine is put.

All work is currently being done with a balanced grinding wheel 4 in. by 54 in. on a 12-in. hub center. A 3-in. wheel is on order for Electro-Motive thrust bearings and for the throws on Fairbanks-Morse engines. The shop also has on order additional 4-in. wheels so that a separate wheel will be available for the different radii between the bearing and the cheek on the different makes of engines. This will avoid the continual dressing to change radii that is necessary with only one wheel, and it will be more economical in wheel use as the usable abrasive will not have to be continually dressed off to change the radius.

"Plunge" grinding, or moving the wheel in and out without traveling, is used exclusively. It is felt that it does a better job and is safer in the event that the stop should fail. One part of the bearing is ground down by a single continual plunge cut to .004 in. over the finished size as measured by dial indicator. The same is done to the second part. If a bearing were too wide for the two plunge cuts to overlap, the bearing would be ground in three plunge cuts. After bringing the entire bearing surface to .004 in. over the finished size, the wheel is dressed and the bearing finish-ground.

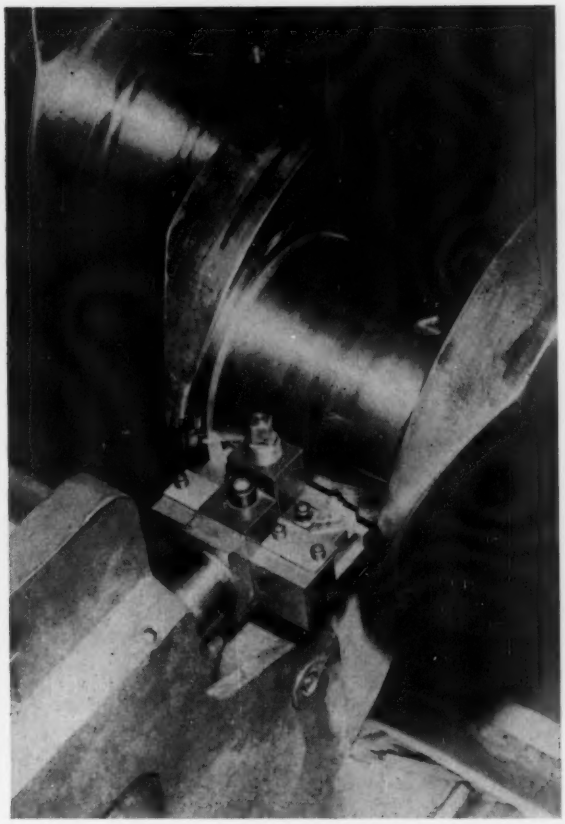
For the initial grinding step, the wheel is first dressed with a diamond, then the radius on each edge roughed in by another wheel and finished with the diamond. The wheel is dressed for the second step (the final .004 in.) entirely by the diamond. In both dressings, the edge radii are checked by a radius gage to insure proper fit of the bearing shells on the ground bearing. The grinding is done at a stone speed of 385 r.p.m., or a cutting speed between 5,000 and 8,000 ft. per min. A red marking crayon is used as a double check to make sure there is overlap between the different grinds and to tell the operator when he is within .0005 in. of the finished size.

Procedures and Conversions

It takes an average of about two hours to convert the grinder from one type crankshaft to another, about three hours to convert from mains to throws on the same shaft. Overall grinding times on some typical engines are:

Alco 244 (12 cylinder)	40 hours
Alco 539 (6 cylinder)	47 hours
Baldwin (In-line 8)	82 hours
EMD (12 cylinder)	50 hours

Main bearings are ground first. This permits the throw



Recessed radii between the bearing and the cheek on Alco 244 engine throws are turned by form tools in this holder.

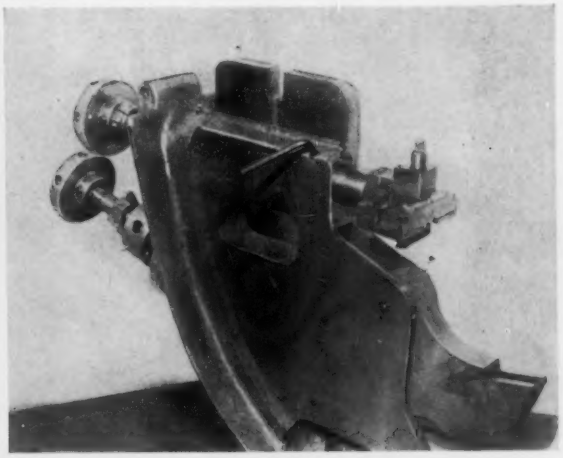
blocks (which hold the main bearings off center to revolve the throws about their own axis for grinding) to be set from the main bearings without error. As the blocks are standard main bearing size, they are shimmed to a total thickness of one-half the amount that the main bearings have been ground undersize. The throws on four-cycle engines are ground in groups of two which are at the same angle. On two-cycle engines, only one throw can be ground at a time as each crank is at a different angle.

A special tool holder mounted on one of the steady rests, and holding two tools which are ground to the proper radius, are used to re-machine the recessed radius in the cheeks of the Alco 244 crankshafts.

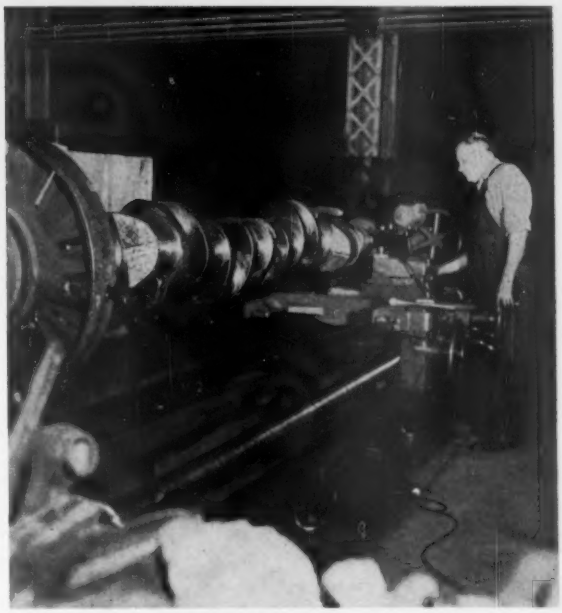
The tool holder is advanced into the work by hand feed, using a screw adjustment which adjusts the steady rest to position and the tools are fed out into the recess by a taper adjusting screw and returned to their center position by spring action.

The procedure followed is to have the tools (shaped to the radius between the bearing and the cheek) in contact with the work, then feed them outward to turn the radius.

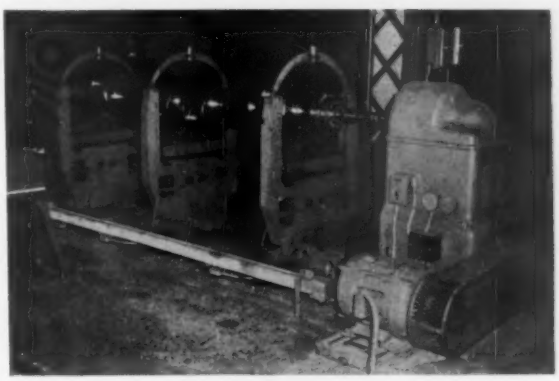
Crankshaft bow is checked on a special layout table on which the shaft rests on a series of movable blocks under each main bearing except the two blocks under each end which bolted to the table. As the shaft is revolved the movement of the intermediate blocks is measured by dial indicators to get an accurate appraisal of the amount of the bow. This method has been found superior to checking the bow in a lathe as the sagging of the unsupported shaft between the centers could give a false indication.



Recessed-radius-turning tools are advanced into the bearing by the machine feed, into the cheek by the small square nut.



Polishing can be done on the grinder on this 30-in. lathe, with the lathe handling the majority of this work.



Balance is restored to reground bowed shafts on a Bear dynamic and static balancing machine.

ELECTRICAL SECTION

Left: The Honeywell-designed pushbutton control panel makes it possible to check the operation of the electronic circuit in 30 seconds. Right: Three electronic thermostats, each 100 times more temperature-sensitive than the average commuter, regulate the year-round air conditioning system in the 100 New Haven m-u coaches. Minneapolis-Honeywell engineer George Hall makes final adjustments on the control system, which can detect the entrance of a single passenger.

Electric Cooling and Heating of Electric Cars

New Haven's 100 new m-u cars are independent of steam supply and are propelled and made comfortable by electric power only

Supplied with traction power from an 1,000-volt a-c power system through transformers and ignitron rectifiers, the 100 new m-u cars now in service on the New Haven are heated with electric resistance space heaters and cooled with electro-mechanical air conditioning equipment, controlled electronically. Lighting is both fluorescent and incandescent. The overhead heating elements consist of a total of 9 units rated at 21 kw. The side wall heating elements, placed 24 per side, have a total rating of 14.8 kw. These units were supplied by the Consolidated Metal Products Company.

Electro-mechanical air conditioning equipment furnished by the Safety Company includes a direct-drive motor compressor unit, and air-cooled condenser unit and an overhead evaporator. The compressor and condenser motors are nominal 600-volt d-c motors, and the evaporator blower motor is a nominal 72-volt d-c motor. The blower fan and motor assembly is arranged to deliver 2,400 cfm under normal operating conditions, but for emergency ventilation the unit will deliver 3,000 cfm.

Each car is equipped with a "Safety" two-kw motor alternator to furnish 115 volt a.c. for fluorescent lighting and the water cooler motor.

The lighting consists of "Safety's" continuous fluo-

rescent ceiling trough using "Safety 68" plastic shades in the main body of the car. High illumination level at the vestibule steps is accomplished with fixtures incorporating a PAR-38 floodlamp which has a self-contained reflector and lens.

Air distribution is controlled in the body of the car through a "Safety" continuous air distributor on each side of the fluorescent lighting trough.

Each car has a "Safety" load regulator to maintain a constant voltage for controls, incandescent lights and fans, and each car has five "Safety" exhaust fans.

Temperature Control

The key to the efficient electric heating and cooling system is a team of three electronic thermostats. Each of these thermostats is 100 times more sensitive to temperature than the human body. Working together, they smoothly and automatically maintain even temperatures in the cars,—winter and summer.

Like three members of a team, each thermostat has its own area and function. The first, the fresh air thermostat, is located above the vestibule ceiling to measure the outside temperature. The second, the discharge air thermostat, is located in the supply duct, to measure the temperature of the air as it is fed into the car. Since there are heating and cooling coils in the duct, this thermostat measures how much the air has been cooled or heated. These two thermostats are the stabilizers,—the advance and rear guard,—for the third thermostat. Their job is to tip off what's going to happen and what has happened temperature-wise. The third electronic thermostat,—called a return air thermostat,—is mounted on the wall of the car and is subject to all the relatively minor influences in temperature change, such as opening of doors and number of people in the car.

There are three other thermostats in the cars, but these play comparatively minor roles and they are electric, not electronic. One is the layover thermostat which will automatically maintain a temperature of 60 deg F. in the car when it is parked in wintertime. The other two electric thermostats control blowers at each doorway, heating cool air that rushes in. This is sort of a side-show that adds to passenger comfort but does not greatly affect the overall comfort of the car,—the job for the electronic thermostats.

Here is how the Honeywell system automatically senses temperature changes and calls for more heat or cooling when the car needs it:

1. The temperature-sensing element of each of the three electronic thermostats is a coil of extremely thin wire that changes its electrical resistance as the temperature changes.
2. This resistance change is reflected to a relay amplifier as a change in voltage.
3. The voltage change is amplified until it has sufficient power to operate a motor.
4. The reversible motor operates a series of micro switches in sequence.
5. These switches control four stages in the electrical heater and two stages in the cooling system.

When the car is on a siding in the wintertime, this is what happens, temperature-wise, as the car is put into service. While the car was inoperative, the layover electric thermostat maintained the temperature at 60 deg. Now a switch on the control panel is put on HEAT and the thermostats will immediately call for three stages of overhead heat plus wall heat. As the temperature begins to rise, the wall heat will go off first. If the temperature continues to rise, the first stage of overhead heat will go off, then the second and then the third.

At this point, a large number of passengers enter the car. It is conceivable that enough body heat would be generated by passengers so that cooling would be required. Honeywell engineers say that 100 commuters, riding in a coach, throw off enough heat to warm a small house.) The main selector switch,—the only part of the system that has to be touched by a crewman,—would then be turned to cooling position. The step controller motor would automatically call for two stages of cooling as needed.

Adding further to the simplicity of the system are the pushbuttons on the control panel that make it possible to check the operation of the electronic circuit within 30 seconds.

France Extending Use Of 50-Cycle Electrification

Since the end of the war, the French National Railroads have been conducting a program of research and testing to develop the use of 50-cycle, 25,000-volt a.c. power for railroad electrification. Most of the French electrified railroads use 750- or 1500-volt d.c. power and the 50-cycle a.c. system is attractive, since it permits of a lighter contact system and requires no rectifiers or rotary equipment in substations. It is expected that the new system will enable the FNRR to electrify lines more rapidly, and still remain within the credit limits of their equipment plan. At the same time, it is expected that the railroads will be benefitted by increased income for the electrification.

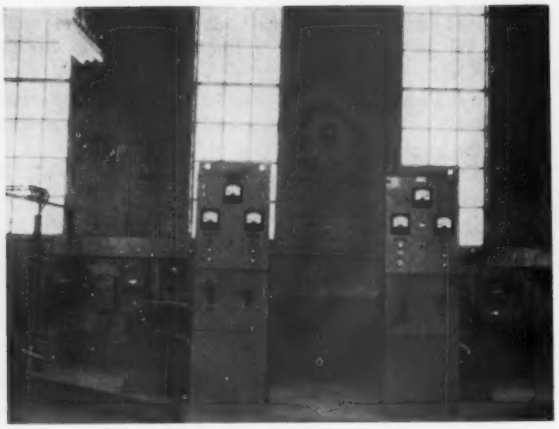
A trial of the new system, conducted in the region of Annecy since 1950, has proved its effectiveness, and has led the French to apply it in the northeastern area.

Three new locomotives,—the first of an order of 162,—have been delivered and have proved their effectiveness on the line from Valenciennes to Charlesville, an 85-mile section, including 1 per cent grades.

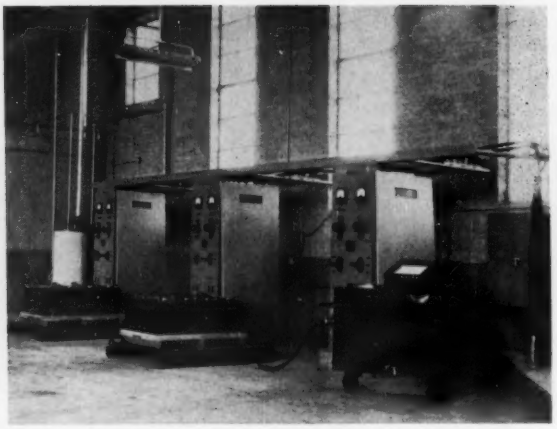
One of the three locomotives is a C-C type. It is designed for freight service and is the first of an order of 102 to be built by Societe Alsthom.

There are also two B-B type locomotives for freight and passenger service. These were built by Le Materiel de Traction Electrique (Schneider Jeumont, S.W.). One employs single-phase Jeumont motors and is the first of an order for 24 units. The second, which is the first of an order for 14 units, will be equipped with Ignitron rectifiers.

Another series of 22, type C-C locomotives will also be built by the Societe Oerlikon which will incorporate a different principle of power conversion. These will go into production at the end of this year.



Two 400-amp and two 200-amp generators mounted on a raised platform supply 45-volt and 90-volt . . .



Charging current to three distributing panels through 500,000 mil insulated cable in place of bus bars.

North Western Builds Ultra-Modern Battery Shop

For an investment of approximately $50,000, the Chicago and North Western has converted an area within its Chicago shops into a battery maintenance facility that is expected to save $25,000 per year by extending the average service life of the system's nearly two million dollars worth of batteries by at least 14 months.

The new shop occupies an area 60 ft by 106 ft, formerly used for pattern storage. The floor is concrete with working areas sloped to drain and treated with "Abana" acid-resistant neoprene-base paint. Two large exhaust fans ventilate the building and heating is by floor-type Trane Torridor blower units.

The interior is painted a pastel green with lower sidewalls of a darker green. The under side of the semicircular roof and trusses has reflective aluminum paint. A modern locker and shower room is included in one corner, and the building is equipped with city gas, water and air. Illumination is by fluorescent fixtures, suspended from above.

General Electric generators and charging panels are used throughout. Battery charge and discharge controls are manually operated and consist of a 45-volt circuit and a 90-volt circuit. The generator controls for both are the same. One 400-amp d-c generator and one 200-amp d-c generator supply the 45-volt system; a second pair of the same amperage capacity supplies the 90-volt system.

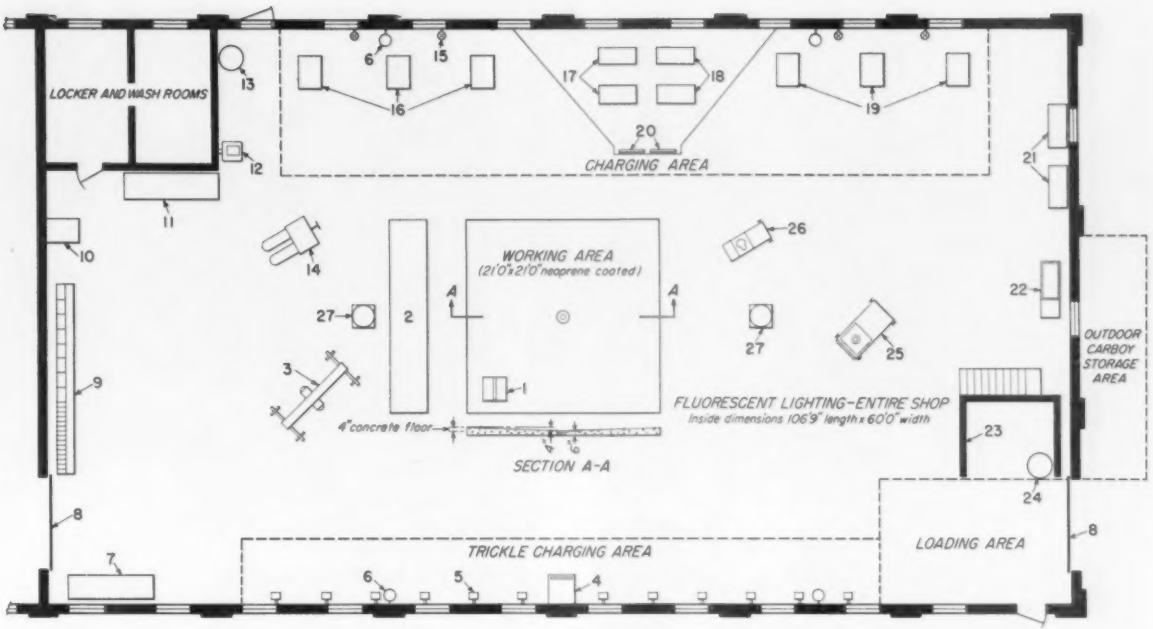
The 400-amp generator must be started first in each case. The system was set up in this manner as the 400-amp machines will carry the normal load comfortably. When the load current exceeds 400 amp an overload light is energized and an alarm sounds. The 200-amp generator can be started only when the 400-amp generator is running. Diactor voltage regulators on each generator automatically control the voltage, and when both generators are running they regulate the load current division between the machines.

The 45-volt panel circuit is designed to charge 32-volt lead acid and alkaline-type batteries at a current up to 200 amp. It can also be used to discharge these batteries at a current rate up to 210 amp. The operator must control the current by means of the manually operated rheostat. A switch is provided to short circuit the battery at the end of the discharge cycle if so desired.

The 90-volt panel circuit is designed to charge 28 or 32-cell lead acid or 45-cell alkaline-type batteries at a current rate up to 200 amp. It can also be used to discharge these batteries at a current rate up to 95 amp. The panels are arranged to permit discharging a 56-cell lead acid or a 90-cell alkaline battery into two units of the circuits. In this arrangement all cells are connected in series. Switches are also provided to short

What New Battery Shop Will Save C & NW

The present investment in car and locomotive batteries on the North Western is $1,591,299, and the average life 70 months. During the first five years operation of the battery shop, the North Western expects to add at least 14 months to the life of the average battery, for a total saving of $318,248 or $63,649 per year. To save the $63,649 will require operating expenses of $19,200 labor, $10,000 material and $10,000 miscellaneous operating expenses, or a total of $39,200. Deducting the $39,200 from $63,649 leaves $24,449 savings per year for the first five years. This is expected to increase for at least 10 years, as the 14 month addition to battery life increases to between 24 and 28 months.



Plan of shop layout.

1. Cell puller
2. Work bench
3. Portable crane
4. Trickle charger
5. Trickle charge outlets
6. Portable crane outlets
7. Unit heater
8. Sliding steel door
9. Parts storage bins
10. Charger for lift truck
11. Open shelf rack
12. Water fountain
13. Hot water heater
14. Walking electric lift truck
15. Water supply
16. 64-volt charging units
17. 90-volt m.g. sets
18. 45-volt m.g. sets
19. 32-volt charging units
20. Generator distributing panels
21. Office equipment
22. Lead lined mixing tub
23. Battery wash room
24. Heater for soda solution (on upper level)
25. Portable carboy cart
26. Portable voltmeter cart
27. Exhaust fans

circuit the battery at the end of the discharge cycle if so desired.

Cables Instead Of Bus Bars

Because a supply of 500,000 circular mil insulated cable was available, it was used in lieu of bus bar construction for distribution of energy from the generator panels to the charging panels. A three-wire loop circuit is employed to avoid I R (voltage) drop at the farthermost station.

A gantry A-frame equipped with rubber tires and a 2-ton slow-speed Whiting electric hoist handles the lifting requirements. The A-frame is long enough and high enough to span a delivery truck for unloading. Four convenient receptacles along the wall permits use of the hoist at any location in the entire building.

A Flotrol electronic charger is used to trickle charge the lead acid batteries after they have been shopped and until such time as their use is required. It is capable of floating 25 batteries at a rate of 1 amp.

Thirty specially constructed skids have been built to which a cover is attached for shipping batteries ready to use to outlying points. With this arrangement the trays can be shipped out on their own skid, and batteries no longer have to be crated for shipment. The skids have been designed for use in connection with a 101 Automatic transporter walking-type truck on which the lift is hydraulic and the propulsion electric.

A wash booth is located at the main entrance. When lead acid batteries are first brought in they are placed inside the booth and washed with a solution of bicarbonate of soda at 110 deg F and then flushed off with clear water. The mixing vat for the soda solution is heated with an electric immersion heater. This is thermostatically controlled and agitated with compressed air, and it is located on top of the roof of the wash booth. Alkaline batteries are washed with hot water only. Excess water is afterwards blown off with an air hose.

A cell puller is fastened to the floor near the drain in the working area. It secures the cases while the plates are lifted out with the electric hoist and placed on the acid proof floor for washing.

Safety has been foremost during the planning of this modern battery shop. Batteries are not tiered but are kept only on skids a few inches above the floor. Acid carts are low to eliminate upsetting. Fresh water is available at many locations.

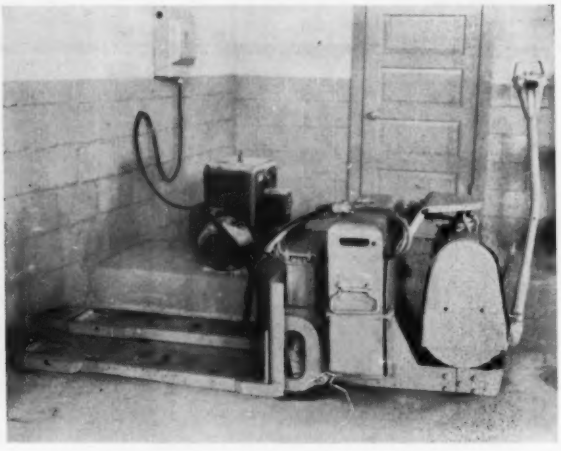
Lead-acid storage batteries are removed from passenger cars and diesel locomotives for reconditioning every two or three years as the need is indicated by the record card. Before removing batteries from locomotives and cars, each tray is numbered with yellow crayon, starting with number one, from the end positive terminal to the end negative terminal. Cables are removed to prevent short circuits, fire or possible explosion. Instructions prohibit prying against the side of the tray, lifting by terminals, or using hooks for moving or lifting batteries. Old batteries, regardless of their appearance are handled as carefully as new ones. Batteries are not moved or shipped without vent plugs in place.

Batteries are shipped in special cases in which the upper portion fits snugly around the batteries and the

Batteries are stored only a few inches above the ground on skids, and prepared for shipment by . . .

Lowering a standard shipping cover over the batteries and necessary blocking, fastening it with four ¾-in. bolts . . .

Then moving it out of the shops, in some cases, by the portable crane but usually by the lift truck . . .



On which the batteries are kept charged by plugging into a separate automatic unit.

lower part bolts to the skid. Box car grab irons have been attached for lifting the upper portion from the skid, but not the complete case with batteries in place. This is lifted by the four eye bolts or by lift-truck when loaded.

When preparing batteries for shipment, they are placed four trays to a skid and the upper portion of the shipping box bolted to the angle iron runners. With the top open, the trays are blocked securely in place. The blocking material must be of proper size to prevent movement of trays, one against the other. The battery record card is placed in a plastic container and sent in with the battery. No other material is shipped in the same case with the battery.

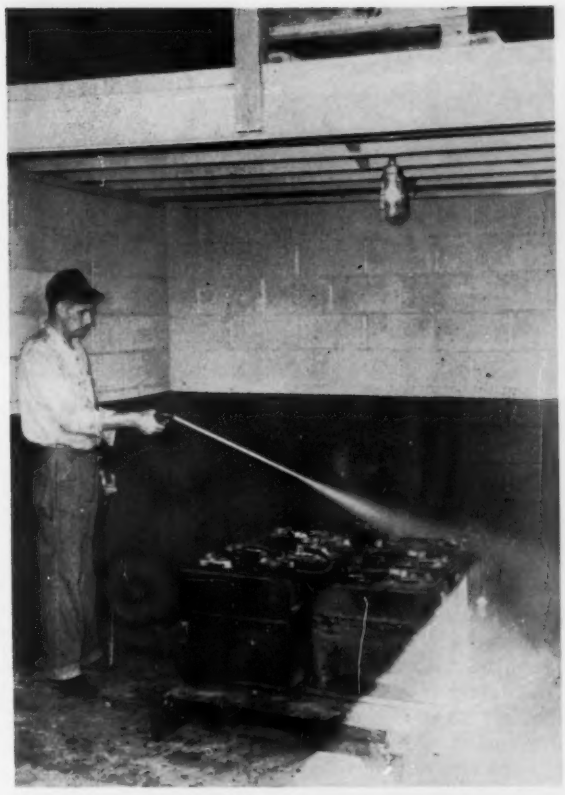
In installing batteries the trays of each set are numbered and are installed starting with number one from the positive generator lead and numbering to the negative generator lead. The battery record card which will be received with a set of batteries is placed in proper location on locomotive or cars.

Spare trays are painted yellow and do not remain permanently in locomotives or cars. Their purpose is to relieve damaged trays while they are being repaired at the Chicago battery shop.

Steps in Reconditioning

All batteries received are first placed in the wash booth and cleaned. All vent plugs are in place and properly tightened to prevent liquid entering cells. The batteries are first washed with cold water under moderate pressure to remove dirt. After this, the acid batteries are washed with a solution of one pound of bicarbonate of soda to one gallon of water at 110 deg F. This is sprayed on through a mixing gun using air pressure for atomizing. When all foaming action on batteries has ceased, neutralization is presumed to be complete and a final thorough wash with cold water is made.

During the cleaning, a 2-in. block is placed under one end of each tray and then under the other end to assure that the bottom of the tray is given the same treatment as the sides and top. Any cells with broken covers or open sealing space are cleaned and neutralized by hand, using a cloth and soda solution, taking care to prevent dirt or other matter from entering into the cell as the



Upper left: Batteries are cleaned in a wash booth at the main entrance on top of which the soda solution is mixed and heated.

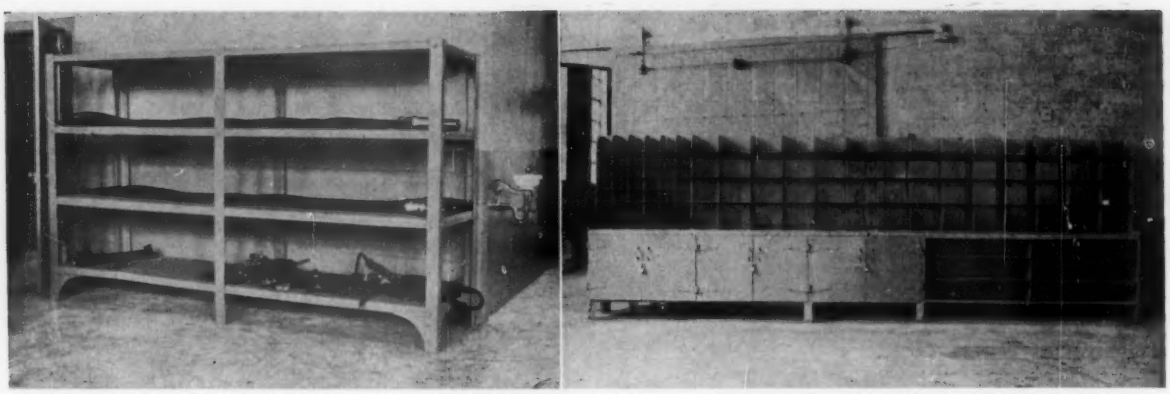
Upper right: All inspections are completed to see whether or not a battery is definitely serviceable before repairs are made.

At right: This desk on four large rubber-tired wheels has a voltmeter to check and a writing surface to record data.

impurities in one cell may have a serious effect upon the service life of the whole battery.

After washing and neutralizing, the batteries go through the following eleven principal steps in being reconditioned and tested:

1. Gravity, temperature and solution height of each cell while on open circuit is taken and recorded. The series circuit is always followed from positive to negative when taking readings. No water is added unless the solution height is below the splash covers and then only a minimum amount.
2. The battery is placed on charge at the proper rate to hold 2.4 volts per cell decreasing the rate to the finish rate. If the temperature reaches 110 deg F at any time, the charging rate is reduced to maintain temperature below 110 deg F.
3. The battery is left on the finish rate until the gravity remains constant for from six to eight hours.
4. Just before the charge is terminated, the voltage, gravity, temperature and solution height of each cell is read and recorded.
5. Gravity is equalized using 1.280 acid while the battery is on charge at the finish rate. Maximum battery gravity is adjusted to 1.240-1.250 on all bat-



Two storage areas take care of the shop's needs—metal shelves (at left) for cables and other large items, and metal storage bins (at right) for smaller items, with doors below for equipment that is to be kept locked up.

teries going through the shop and the nameplates stenciled accordingly.

6. After the battery has been equalized to 1.240-1.250, the voltage, gravity, temperature and solution height with the battery on charge at the finish rate is again read and recorded. Then the electrolyte is brought up to the maximum level by adding 1.250 acid and the charge terminated.

7. The battery is left standing over night on open circuit. This is done not more than 16 hours before starting its discharge capacity test.

8. Immediately before starting the discharge test, the gravity and temperature of the battery on open circuit is recorded once more.

9. The five-hour discharge test is started at the proper rate as indicated on the manufacturer's chart of discharge capacity test for that particular make and type of battery. Immediately thereafter cell voltages are taken and recorded.

10. After the battery has been on discharge for 2½ hours, the cell voltages, temperature and discharge rate as well as the time are taken. This is the 50 per cent capacity reading.

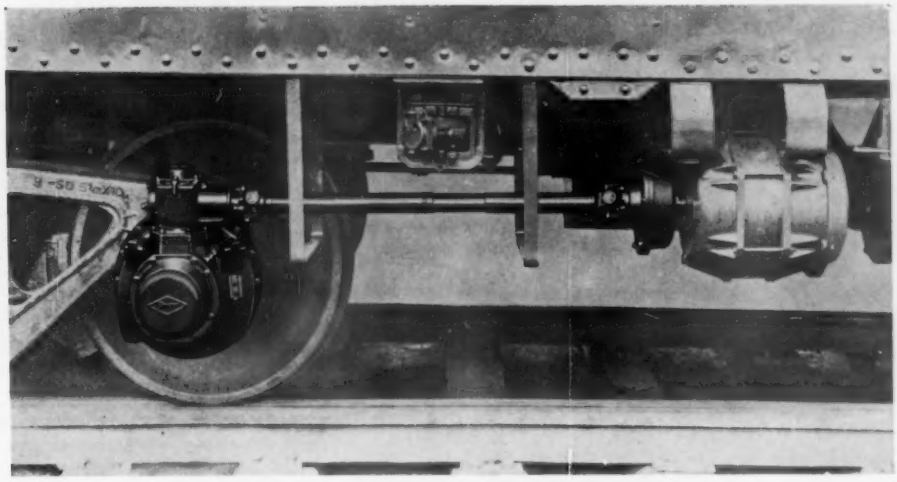
11. Four hours after the discharge capacity test is started, the 80 per cent reading, the cell voltages, gravity, temperature, discharge rate and time are taken and recorded. All cells reading 1.75 volts or above are considerel satisfactory for return to normal service. Those below 1.75 volts will not give satisfactory service and are to be rebuilt or sent to the manufacturer for rebuilding. Batteries reading slightly below 1.75 volts may be used in limited service such as baggage cars if there is an immediate demand.

Any trays in need of cover replacement or other repairs are taken care of at this time as there is no need of spending time on batteries until it is learned that they are definitely serviceable. In cases where only part of the trays in a set of batteries proves to be satisfactory for normal service, the set may be completed by filling in with good trays from like sets of similar age and condition. Different types and makes of trays are not mixed.

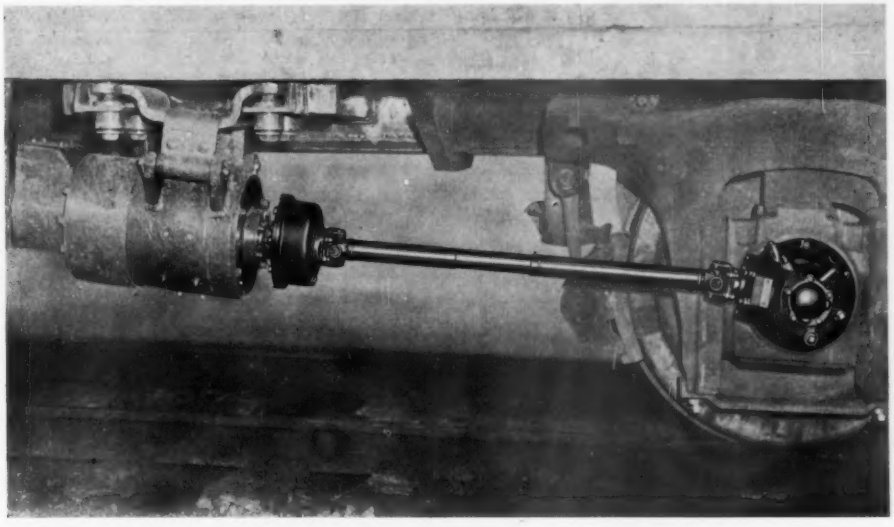
Alkaline batteries are similarly shopped in accordance with manufacturers' instructions.

The eight-hour capacity of a battery as well as the tray numbers and battery number are stenciled on the nameplate. Reconditioned battery sets are given a new number starting with 100. This number remains in effect during the complete life of the battery with different letters preceding the number to denote different makes.

UNION PACIFIC'S SALT LAKE CITY DIESEL SHOP NEARS COMPLETION. Started in 1951, the diesel repair shop at Salt Lake City, Utah, is about 70 per cent completed. It will be the railroad's main diesel repair shop, and will cost $5,600,000. Standing in the place of the o'd roundhouse for steam locomotives, the new shop will be used for the maintenance of both diesel and gas turbine-electric locomotives. The high bay of the shop is 410 ft long by 162 ft wide, and the two side bays are respectively, 220 ft by 102 ft, and 303 ft by 80 ft. Equipment will include a 250-ton overhead crane, and a 90-ton drop pit table.



A horizontal installation for plain bearing axles.



A horizontal drive for roller bearing axles.

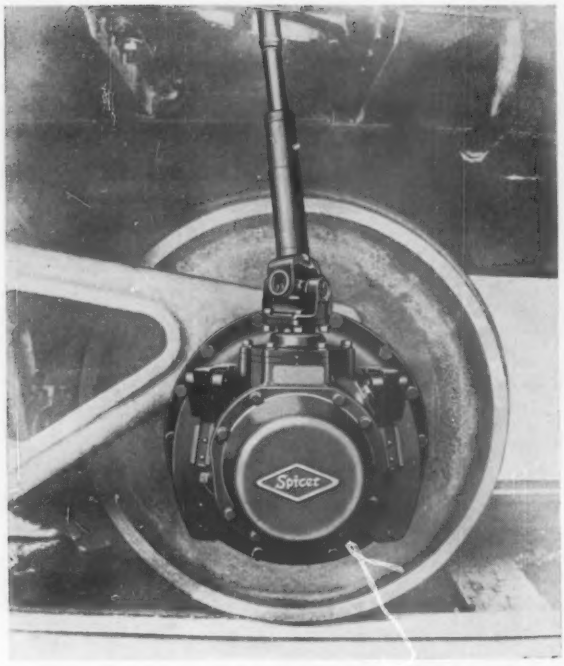
Direct Drive for Caboose Generators

Equipment is now in production for plain or roller bearing axles and for horizontal or vertical drives

The story of direct mechanical drive for caboose generators was told in the June 1953 issue of *Railway Locomotives and Cars*, by W. S. H. Hamilton, then engineer, electrical equipment, New York Central. Now the drive has been made available to the railroads as a manufactured product by The Dana Corporation, Toledo, Ohio, as a Spicer drive for generators up to 5 kw. capacity. It is designed for use on cabooses and mail, baggage and refrigerator cars.

Dana Corporation engineers started to design such a drive in March, 1945, and the first experimental units were completed and installed in January, 1947. Since that time, a continuous development and testing program has been carried on to work out a satisfactory drive that would be a fitting companion to the large Spicer Drive used on passenger cars.

More than 3,000,000 miles of testing were run in actual operation by two railroads. Over 2,500,000 miles of these tests were made with the final approved design on both baggage cars and cabooses. Five of these test



A vertical installation for plain bearings, showing the lift lids for inspecting and lubricating the journal bearing and packing.

drives have been in operation for an average of over 400,000 miles each.

The new drive has been designed to connect with the end of the axle, rather than be mounted around the large center section of the latter. Because of this construction, the drive may be installed either on the vertical plane, with the generator inside the car, or horizontally with the power unit underneath.

This feature also provides several other advantages not obtained with drives mounted at the center of the axle. Greater safety is one of them. It is not necessary to get under the car for any work connected with the drive or the generator. Easier and quicker inspection and maintenance for both drive and generator is another important feature.

In cases where replacement becomes necessary, it is not necessary to remove a wheel, nor to check alignment. No torque arm or torque arm mounting is required, and no safety arm is needed. The small drives are interchangeable for all sizes of axles, and require no axle mounting. Need for machining the center section of the axle is likewise eliminated.

All important parts are fabricated from heat-treated alloy steel. In operation, the drive does not interfere with normal movement of the axle, nor with the regular lubrication or operation of the journal bearings.

Two models for all types of cars and axles are available. The Model 2 is interchangeable for all sizes of plain bearing axles from 4¼ in. by 8 in., up to and including 6 in. by 11 in. The Model 2-1 drive is interchangeable on all sizes of roller bearing axles and for the various makes and types of bearings.

Both models may be used on old or new cars. They are furnished in four different ratios, enabling selection of the one assuring the most efficient operation of the generator over the entire car speed range.

Vertical Drive

The Model 2 vertical gear unit is attached to the journal box by a flange mounting. The coupling shaft which connects the end of the axle to the gear unit consists of two universal joints which allow for maximum angular movement due to wear of misalignment in any plane between the axle, journal box and gear unit.

One universal joint is attached to the end of the axle, and the other to the gear hub inside the gear unit. These universal joints are connected by a short shaft with a slip spline on one end inside the gear unit which permits full free endwise movement of the axle. The spiral bevel gears are made of case hardened alloy steel, and are rigidly mounted on anti-friction bearings. The gears, bearings, slip spline, and universal joint within the gear unit operate in a bath of light oil, completely sealed and protected from dirt, water, etc. The lubricant is self-contained within the gear unit and is independent from the journal bearing lubricant.

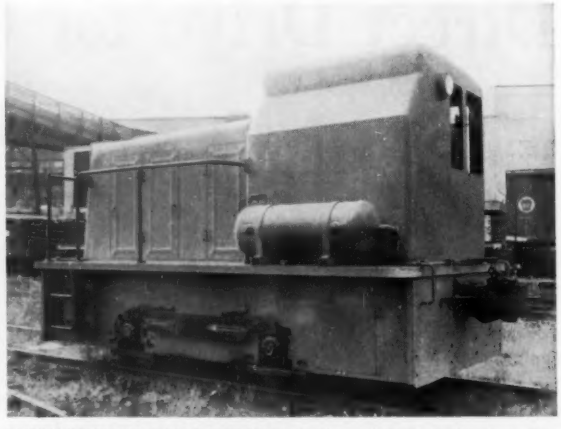
Lubrication of the journal bearings is the same as the regular axles. Two lift covers are provided which permits the conventional method of lubrication and waste inspection.

All gear units are completely assembled and the gears and bearings adjusted before being shipped from the factory. No parts need be disassembled or adjustments disturbed when the units are mounted to the journal box. The alignment and adjustment of the gears and bearings remain constant as they are not affected by any misalignment of the mounting.

Horizontal Drive

The horizontal drive is quite similar to the vertical and many of the same parts are used. However, an additional bevel gear box has been added on the top, thereby changing the vertical arrangement to a horizontal drive. This permits the propeller shaft to be mounted high and clear of the lift covers when opening.

The drive is being marketed in the United States by the Spicer Manufacturing Division of the Dana Corporation, Toledo 1, Ohio, and in Canada by the Holden Company, Montreal, P. Q.



LOCOMOTIVE WITH BLIND SIDE. A General Electric diesel-electric locomotive with no windows on one side of the cab is now in the service of the Allied Chemical and Dye Corporation, in its Semet-Solvay Division's Ashland, Kentucky By-Product Coke Plant. The windows were omitted to protect the operator from the heat of incandescent coke.

Maintenance Testing of Insulation Resistance

An outline of present practices as applied to diesel-electric locomotives and suggestions for improvements which would insure better performance of electrical equipment

W. E. Kelley

By W. E. Kelley

The diesel-electric locomotive has been made possible to a large extent by the electrical system which so efficiently controls and transmits to the driving wheels and auxiliaries the concentrated horsepower of our modern diesel engines. This electrical system, consisting of generators, motors, switches, relays, meters, resistors, and thousands of feet of wire, depends primarily for its satisfactory operation on the various insulating materials which confine the electrical currents to their proper circuits.

The insulating materials on diesel-electric motive power are subjected to more severe stresses under normal operating conditions than those of almost any other electrical system. These stresses, which result in progressive weakening of insulation values, are caused by heat, dirt, moisture, oil, vibration and aging. Added to these are the cases where the electrical systems are stressed beyond their designed limit by unusual operating conditions, such as the necessity of moving a train when one unit of a locomotive has failed.

To determine the weakening of insulation and to prevent as many road failures as possible, a system of periodic checks or tests of insulation resistance of the various pieces of electrical apparatus and electrical circuits has been set up. These tests are a part of the regular preventive maintenance schedule and follow much the same pattern for most railroads. The procedure used by one major railroad is given here as a typical example.

The schedule of inspection and repairs for road diesel-electric locomotives is as follows:

1. Daily or turn-around inspection.
2. Semi-monthly inspection.
3. Monthly inspection.
4. Quarterly inspection.
5. Semi-annual inspection.
6. Annual inspection.
7. Low scheduled periodic maintenance.
8. High scheduled periodic maintenance.

The time between scheduled periodic maintenance shoppings varies with the type of motive power, i.e., passenger or freight, and also with the design unit.

The passenger diesel-electric locomotive maintenance cycle is alternately one low scheduled maintenance period and one high scheduled maintenance period. Depending on the design of unit, the low period varies from 18 to 24 months and the high period varies from 36 to 48.

The freight diesel-electric locomotive maintenance cycle is either two or three successive low scheduled maintenance periods, depending on the design of unit, followed by one high period. Units covered by the first schedule receive the first low period at 24 months, the second at 48 months, and a high period at 72 months. The other units receive successive low periods at 18, 36 and 54 months, and a high period at 72 months.

The schedule for switching-type diesel-electric locomotives varies somewhat from that of road locomotives in that they receive no semi-monthly inspection and scheduled periodic maintenance has been set tentatively at 10-year intervals.

Daily or Turn-Around Inspection

A visual inspection is made of all apparatus in electrical cabinets, main and auxiliary generators, traction motors, blowers, fans, cab heaters and defrosters.

For diesel passenger locomotives at a daily or turn-around inspection at the home terminal, a test for power or control grounds is required. For freight and switching locomotives a test is not required unless trouble is indicated from inspection, from the condition of the ground relay, or from operating crew reports.

If a grounded condition of the electrical system is indicated, a more thorough check of the insulation resistance to ground is made with a megohmmeter to determine in which part of the power or control circuits

---

Abstract of a paper presented by W. E. Kelley, at the Fall General Meeting of the American Institute of Electrical Engineers, held October 11-15, 1954, in Chicago. Acknowledgment is made to L. S. Billau, formerly Electrical engineer, Baltimore & Ohio, for his cooperation and assistance in preparing this paper.

the ground is located. In the limited time allotted for a daily inspection, this can be a difficult problem, particularly because of moisture grounds in the electrical system. These grounds are caused by the large amounts of steam, water and cleaning fluids that are used for cleaning both the inside and outside of diesel-electric locomotives and by the extreme sweating conditions on these locomotives during the winter months. Usually, this type of ground disappears when locomotives warm up to operating conditions in service.

In many cases, megohmmeters used for insulation testers are not helpful in differentiating between moisture grounds and solid grounds which will cause trouble. Direct current voltmeters have also been used to check voltage drop to ground of control circuits, but have not proved successful because they are so sensitive that even a moisture ground will show a large voltage drop. Table I shows the characteristics of several commonly used voltmeters.

TABLE I—CHARACTERISTICS OF DIRECT CURRENT VOLTMETERS WITH 75-VOLT SCALE USED FOR CHECKING CONTROL CIRCUITS

	Voltmeter 1	Voltmeter 2
Internal resistance (Ohms per volt)	100	200
Minimum amperes flowing at following voltage values		
75 volts	.0100 amp	.0050 amp
50 volts	.0066 amp	.0033 amp
25 volts	.0033 amp	.0017 amp
12 volts	.0016 amp	.0008 amp

Because a quick answer must be given as to whether a diesel-electric locomotive is available for service, several quick methods for locating grounds are widely used.

For control circuits, a 75-volt locomotive cab lamp is used with the circuits energized. Table II shows the characteristics of two types of these lamps. A 50-watt lamp is generally used. Since most moisture grounds cause less than 0.25 amp. leakage to ground, a discernible glow of a test light indicates a serious ground which must be located.

TABLE II—CHARACTERISTICS OF 75-VOLT DIESEL-ELECTRIC LOCOMOTIVE CAB LAMPS

Type	25A17/RS	50A19/RS
Watts	25	50
Amperes at 75 volts	.333	.666
Minimum visibility of lamp:		
Volts	12	11
Amperes	.13	.24

For power circuits which cannot be tested while energized, a bell-ringer set is used with the same results.

In general, high potential tests are not used for trouble-shooting except as a last resort, and then not until motors and generators have been disconnected from the circuit to be tested. When it is deemed necessary, a 1,200-volt high potential test is made on power circuits after all apparatus has been dried and blown out. In cases where a ground cannot be cleared from a circuit or located in any other way, the burn attachment of a high potential testing machine is used.

Interim Inspections

A semi-monthly inspection is given to passenger and freight locomotives and, as far as electrical testing is concerned, it is the same as a daily inspection with the exception that a test must be made for power and control grounds using a megohmmeter.

There are more mechanical items of the locomotive to check at this time than during a daily inspection, and during this extra time that the locomotive is out of service a closer check is given to the commutators, brushes, leads and insulators of all motors and generators, along with a closer inspection and cleaning of the apparatus in electrical cabinets.

Monthly inspection is a basic inspection period for all types of diesel locomotives,—passenger, freight and switching,—corresponding to the boiler wash required for steam locomotives.

All motors, generators and electrical cabinets are thoroughly inspected, cleaned with an approved cleaning solution, usually petroleum spirits, and blown out with dry air. After this, all power and control grounds must be eliminated, which means that all circuits must show an insulation resistance to ground of at least one megohm.

A test light, bell-ringer set or high potential test machine may also be used to expedite the locating of grounds during this inspection.

At the quarterly inspection period, all of the electrical testing performed at previous monthly inspections is required. The principal additional work necessary at this inspection is the checking of the operation and calibration of relays, regulators, thermostats, and alarm and safety switches.

Semi-annually the testing done on previous inspections is repeated. In addition, all exposed wiring is cleaned and painted with an insulating paint, and creepage surfaces of rotating apparatus are cleaned and painted.

Annual Inspection

Once a year, all inspection, testing and repairing performed at the monthly, quarterly and semi-annual inspections are required on all passenger, freight and switching locomotives.

At this time, a high-potential test, as required by I.C.C. Rule 253, must be made on all high-voltage wiring and all high-voltage electrical rotating apparatus. This includes all circuits with a potential of more than 150 volts. The test voltage is applied for at least one minute between each section of the power circuit and the locomotive frame. For circuits other than generator or motor windings, the test voltage is 75 per cent above normal working voltage; for windings the test voltage is 50 per cent above normal working voltage.

Before this high potential test is given, all electrical insulation must be clean and dry and the insulation between any conductor and ground should be measured by means of a megohmmeter, which must show an insulation resistance of at least one megohm. If the resistance is less than one megohm, the faulty circuit must be corrected.

Scheduled Periodic Maintenance

At this time, the locomotive is brought into the back shop where important components are given an overhaul.

During the low scheduled maintenance period many pieces of apparatus are given a heavy repair on the locomotive. For instance, main generators after passing a megohmmeter test have the brush holders removed for check and repair. The commutator is then checked,

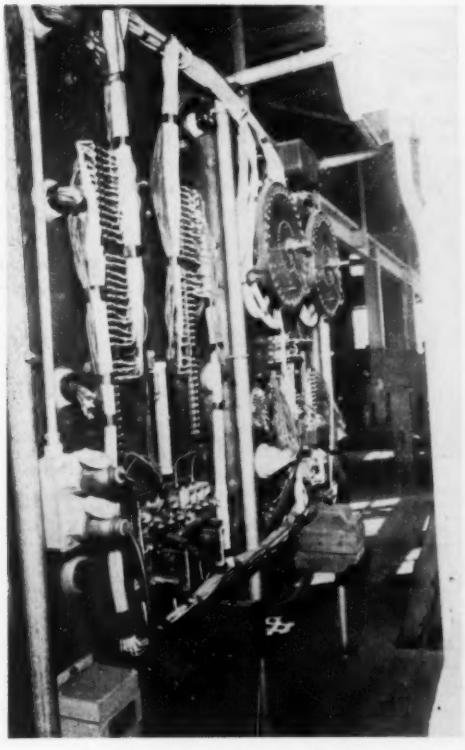
(Continued on page 72)

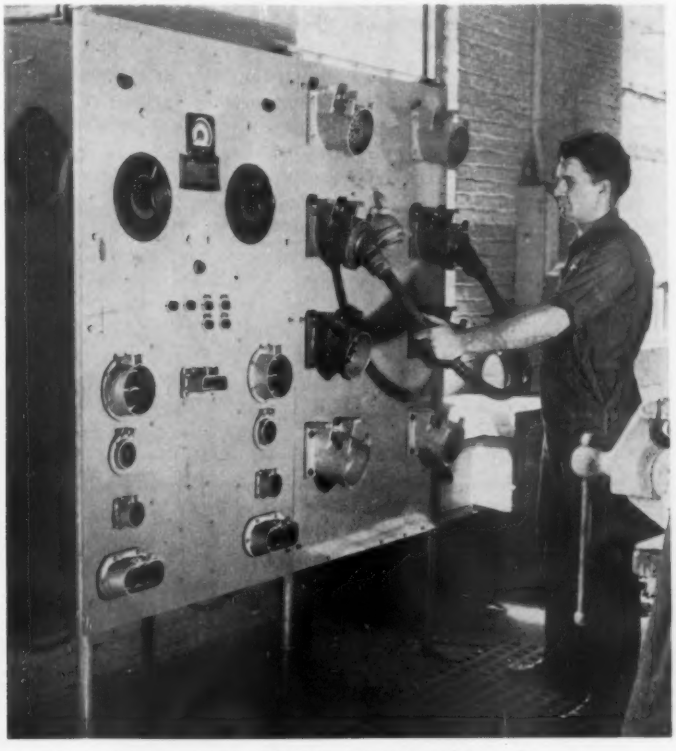
The C. M. S. P. & P. shops at Milwaukee, Wisconsin.

Panel Tests All Type Jumpers

The electrical shop of the Chicago, Milwaukee, St. Paul & Pacific at Milwaukee, Wis., has come up with a jumper testing panel which provides continuity, voltage and current tests for seven different jumpers used on locomotives and cars. In each case, the procedure is the same. Individual conductors in the jumpers are checked for continuity, are made to carry 100 amp for 10 seconds, and are subjected to a voltage of 750 volts to ground. The types of jumpers which may be tested on the board include, on the right panel 27, 21 and 14-conductor E.M.D. locomotive jumpers, and on the left panel, from top to bottom, electric brake, steam generator, train radio and Fairbanks-Morse control cables. On the right hand panel, there is also a receptacle for a cable with a center tap. The bottom pair are spares.

The power source for the board is 220 volts a-c. Voltage for the insulation test is obtained by a step-up transformer and current for the load test is supplied by a brazing transformer, having a 220-volt primary and a 6-volt, 200-amp secondary. A series resistor in the secondary limits the current to about 100 amp.





Left: Back of panel showing wiring arrangement and location of equipment. Right: Jumper test panel in service.

The dial switches near the top of the left-hand panel connect with individual contacts in the plugs on opposite ends of the jumpers.

For a continuity test, current is applied to one contact on the left-hand dial switch, while the right-hand dial is moved to all contacts. Then leads nos. 2, 3, 4, etc., are tested in the same manner while the cables are worked by hand. A small light in the upper left hand corner lights if the circuit is open, and one at the right indicates a short between conductors or a short to ground.

For a load test, a start button near the center of the left-hand panel sets up a circuit which causes 100 amp to flow from the current transformer to one dial switch, through one jumper conductor, to the second dial switch and back to the transformer. Then by dialing the points on the switches 1-1, 2-2, etc., all conductors are tested. A telechron clock starts when the start button is pushed and opens the circuit at the end of a ten-second period.

A second start button applies 750 volts to the conductor selected by the dial switch. A spring-opened push button in series with the circuit is used to limit the duration of the voltage test.

Maintenance Testing Of Insulation Resistance

(Continued from page 70)

cleaned and covered. A thorough visual check is made of the armature and of the fields. If no defects are found the interior of the generator is sprayed with an insulating paint. Conversely, most apparatus is removed and sent to specialized shops for repair during high scheduled maintenance period.

All circuits are checked with a megohmmeter at this time and must have a resistance to ground of at least one megohm. There is an opportunity at this time to check cables and conduit and wiring which are not normally accessible, and any defective wires or cables are replaced or repaired. Dirt which has accumulated in out-of-the-way places is removed and all electrical apparatus and cabinets are cleaned with petroleum spirits.

A high potential test as required at the annual inspection is given at this time.

After cleaning, the armatures and stators of traction motors and generators are tested for three minutes by motor-driven megohmmeters. If the final reading is not above 100 megohms, the piece of apparatus is given several hours of drying in an oven. If the reading is still low and additional cleaning and drying do not prove successful, repairs indicated by a high frequency surge tester or high potential test machine are made. When a satisfactory reading above 100 megohms is obtained, the apparatus is given the high potential test.

In rewinding traction motor and generator armatures, many of the high potential tests, formerly made after each step of winding, have been satisfactorily eliminated by the use of a high frequency surge tester. Many defects are found with the surge tester which will not show up with a high potential test. Only those high potential tests deemed absolutely necessary, including the final test, are made.

Additional methods and further development of present methods of testing electrical insulation of diesel-electric locomotives are needed. A portable meter, preferably with a power supply, and designed not to indicate grounds below a determined value of leakage current, is needed for maintenance terminals.

Standards should be set up for the use of direct current over-potential testing in connection with traction apparatus.

Good electrical design is essential if electrical insulating materials are to give satisfactory service with a maximum life. For instance, the use of neoprene insulated wire for control circuits caused consistently low megohmmeter readings because of the distributed leakage peculiar to this type of insulation material.

An Electrical Section Report . . .

What Voltage for Passenger Cars?

A nominal voltage of 64 d-c for passenger equipment on cars has been recommended to the Electrical Section, A.A.R., by the A.A.R. Mechanical Division's Committee on Passenger Car Specifications. The subject was referred to the Car Electrical Equipment Committee of the Electrical Section for comments and recommendations, and the committee was instructed to send out a questionnaire to determine the railroads' preference as to voltage for axle generator equipment to be installed on new cars. The result was as follows:

	Votes	Number of Railroads	Per Cent Votes	Per Cent Railroads
Axle drive equipment, 32 volts d-c	8,901	13	22.77	22.05
Axle drive equipment, 64 volts d-c	16,456	33	42.09	55.90
Axle drive equipment, 110 volts d-c	13,734	13	35.14	22.05
Totals	39,091	59	100	100

Inasmuch as there is a plurality for 64 volts, the committee submits that this plurality be accepted as the best indication of opinion that can be obtained at this time.

The committee further instructed the secretary to submit the above recommendation, together with the tabulated report, to the Passenger Car Specification Committee of the Mechanical Division for its consideration.

In line with the above, and included in the letter ballot was a question concerning the voltage for the individual power plants mounted on the car body. The preference is tabulated as follows:

	Votes	Number of Railroads	Per Cent Votes	Per Cent Railroads
Individual power plant, 32 volts d-c	4,147	4	10.6	7
Individual power plant, 64 volts d-c	2,343	6	6.0	11
Individual power plant, 220 volts a-c	32,421	47	83.4	82
Totals	38,911	57	100	100

In view of the majority vote for 220 volts a-c for individual power plants, it is recommended that this voltage be adopted as standard for future passenger cars. This recommendation will also be furnished to the Passenger Car Specification Committee of the Mechanical Division for consideration.

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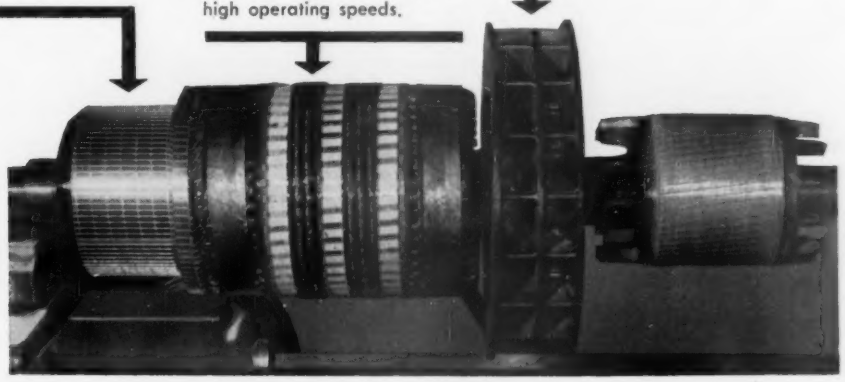

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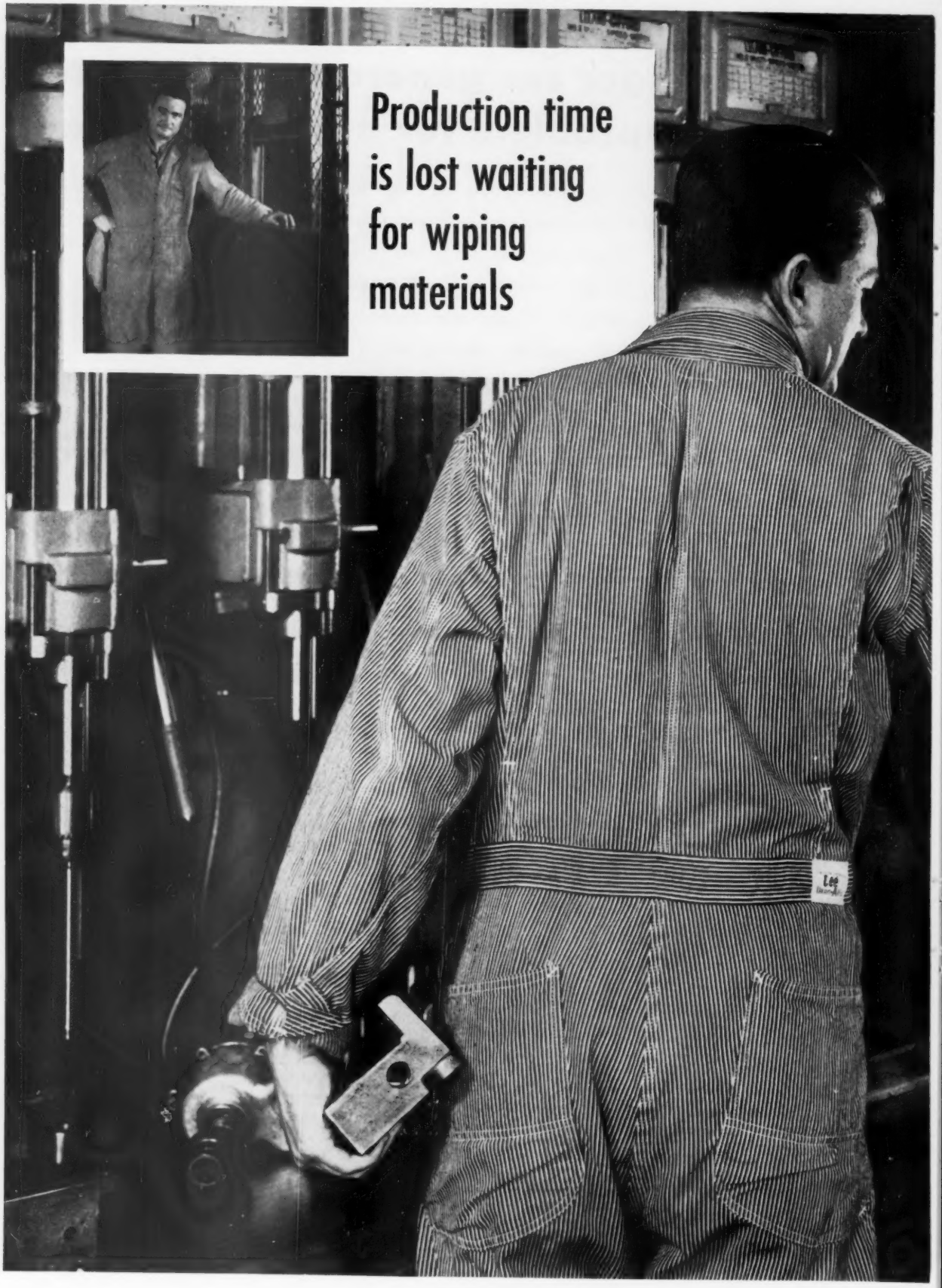
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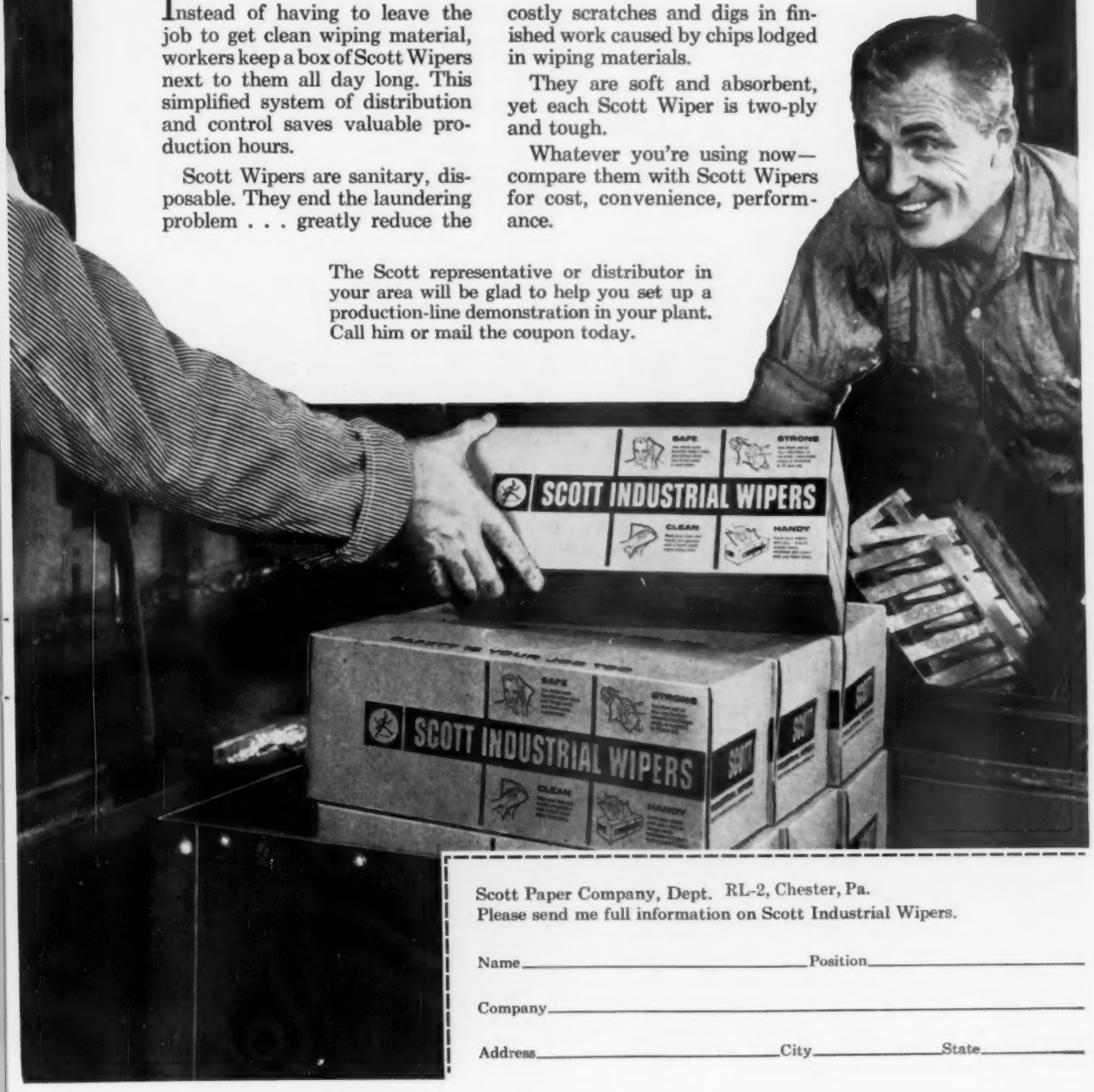

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Questions and Answers

General Motors

Diesel-Electric Locomotives

This is a new series of Questions and Answers pertaining to General Motors diesel-electric locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

Miscellaneous Equipment Sanding

(Manual 2310—page 113)

G109-Q—What action takes place when the sanding bail is depressed (using hinged handle brake valve)?
A—When the sanding bail moves downward it opens a valve to supply main reservoir air to the sanding equipment.

G110-Q—How is manual sanding obtained when the brake valve has a rigid type handle?
A—An independent sanding operating valve is installed. The valve is operated by pushing the lever forward until it latches.

Speed Recorder—Locomotive Overspeed Control

G111-Q—Locate and describe the speed recorder
A—The speed recorder, located ahead of the controller, is a hydraulically operated speed indicator with a speed recording tape and an odometer.

G112-Q—How is the speed recorder driven?
A—It is driven from the No. 1 axle of the A unit through a flexible cable.

G113-Q—What device is contained in the speed recorder and how does it function?
A—The speed recorder contains a maximum speed device which will initiate a full service (emergency on some railroads) application and trip the PC switch when the maximum speed setting is exceeded.

Windshield Wipers—Horns—Locomotive Bell

G114-Q—How are the windshield wipers controlled?
A—By valves, one each, located on the fireman and engineman's side of the cab.

G115-Q—Do the windshield wipers operate independently of each other and what precaution should be taken?
A—Yes. The wipers should not be run on a dry glass as scratching of the surface may result.

G116-Q—How are the horns controlled and operated?
A—The horns (front and rear) are operated by air valves controlled by pull cords above the control stand. The shut off valve is in front of the No. 2 main reservoir.

G117-Q—Where is the signal bell located and how is it operated?
A—Under the locomotive floor behind the pilot on the left side. It is operated by a valve located at the engineman's station. The bell shut off valve is to the left side of the front end of the No. 2 main reservoir.

Cab Heaters

G118-Q—Locate and describe the cab heaters.
A—A cab heater is on each side of the cab. Hot water from the engine cooling system passes through the heaters, and motor driven fans provide air circulation.

G119-Q—How is the water flow controlled and what precaution must be taken?
A—The waterflow to both heaters is controlled by a valve in the supply line, located above the left-hand engine room steps. This valve must be kept wide open in freezing weather.

G120-Q—How can the heater output be varied?
A—By use of the cab heater switches which have four positions: OFF-1-2 and 3.

G121-Q—What may be done if the lead unit is shut down in freezing weather?
A—Steam, if available, may be admitted to the cab heaters.

Defrosters

G122-Q—Describe the defroster.
A—Each side of the cab is equipped with a defroster motor and fan which blows heated air on the inside of the front cab windows.

G123-Q—How are the defroster motors controlled?
A—Both motors are controlled by the one defroster switch in the control push button switch box.

Classification Lights

G124-Q—Describe the classification lights.
A—A permanently fixed, clear bulls-eye is provided on each side of the nose. Inside the nose and behind each bulls-eye a small compartment contains the classification light bulb and colored lenses.

G125-Q—What color lenses are provided and how are they moved into position?
A—Red and green lenses are provided in each compartment which can be moved into position between the bulb and the bulls-eye. To accomplish this, a locking pin is removed, the desired lens swung into place and locking pin replaced. The lens box is accessible from inside the locomotive nose section.

G126-Q—What will show when both lenses are out of position?
A—When both lenses are out of position, the permanent bulls-eye lens will show a white light, thus making three colors available.

Trucks

(Manual 2310—page 115)

G127-Q—Describe the truck installation on the F-7 and FP-7 locomotives.
A—Two four-wheel flexible trucks are provided on each locomotive unit. The outside swinger method of suspension developed by the manufacturer, provides increased stability on curves, better riding qualities and reduced body roll.

G128-Q—How are the axles equipped?
A—The axles are equipped with Hyatt roller bearing journal boxes. A stench bomb on each journal box will release a pungent odor if the temperature inside the journal box exceeds 220 deg F.

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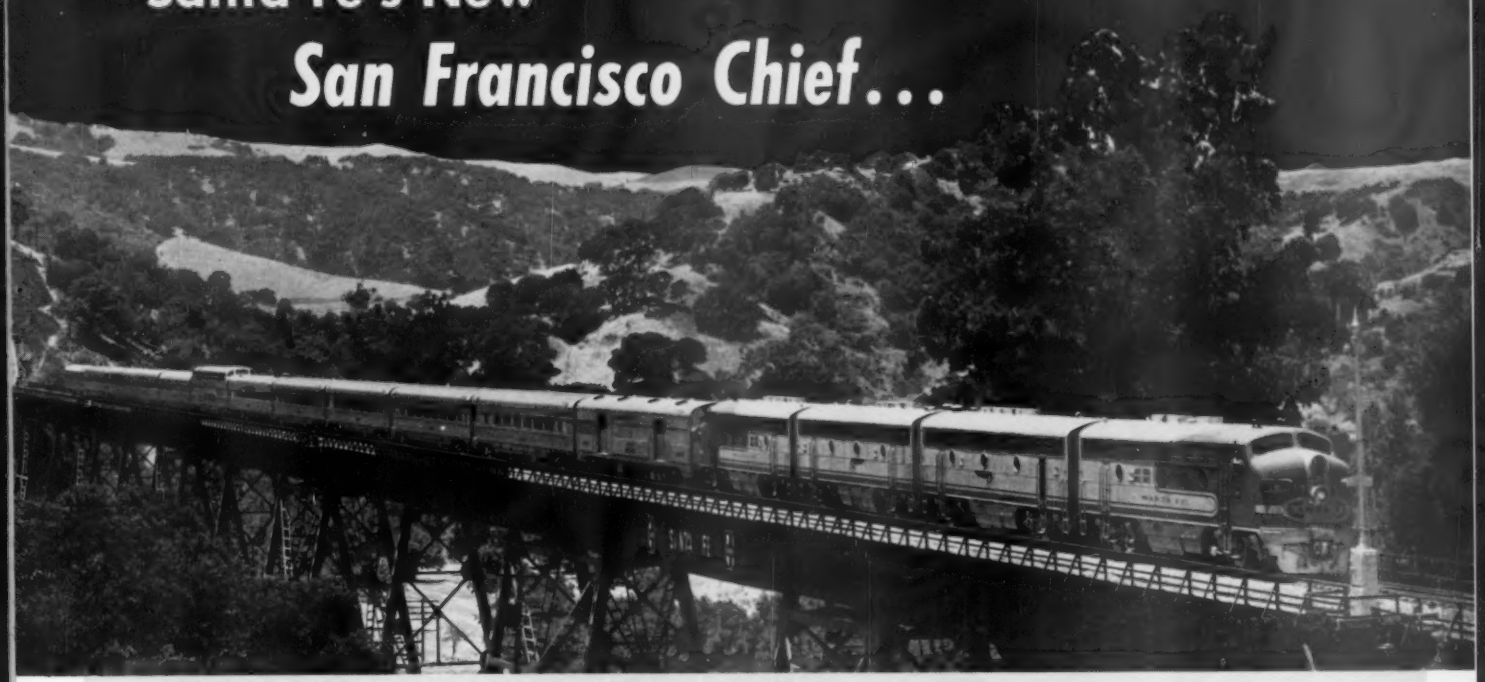
Santa Fe's New

San Francisco Chief...



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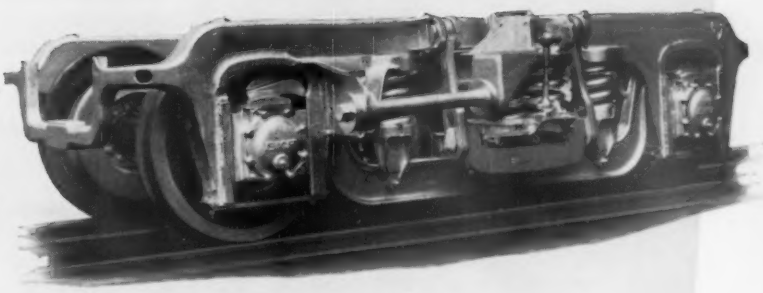
Trucks and New Central Bearings



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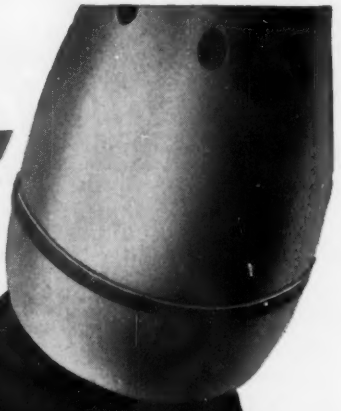

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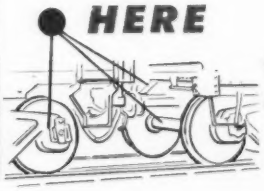

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Fairbanks-Morse

Diesel-Electric Locomotives

This series of Questions and Answers pertains to Fairbanks-Morse diesel-electric locomotives. The references to manual and page numbers indicate where the original material may be found in the builder' technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

F106-Q—What precaution must be taken when operating this switch?
A—In order to avoid a bad arc, always snap off locomotive lights breaker before operating the switch.

Sanders

F107-Q—How are the sanders operated?
A—Electro-pneumatically ahead of each truck in either direction.

F108-Q—How is sanding controlled?
A—Either from the separate sanding valve on the right of the engineer, or by depressing the brake valve handle below horizontal position against the bail. The installation depends on railroad specification.

F109-Q—What takes place when the valve is operated or the handle is depressed?
A—The resultant flow of pressure operates the sanding pressure switch.

F110-Q—Where is the sander pressure switch located?
A—It is located on the right hand equipment rack in the nose.

F111-Q—With what other switch may the sander pressure switch be confused?
A—It may be confused with the power knockout switch (PC) located above, on the same rack.

F112-Q—How does the sander pressure switch function?
A—Functions to energize the sand control train line wire.

F113-Q—How is this wire connected?
A—It is connected in each unit to the FORWARD and REVERSE sanding magnet valves through reverser interlock.

F114-Q—What is the purpose of the sanding magnet valve?
A—This magnet valve functions to control sanding on either end of each truck.

Horn Shut-Off Cock

F115-Q—Where is this cock located?
A—In the nose on the right bulkhead.

Locomotive Bell and Valve

F116-Q—Where is the locomotive bell and bell ringer valve located?
A—The locomotive bell is located just behind the pilot on the engineer's side and the bell ringer valve is between the automatic and independent brake valves.

Engineer's Instruments Black Lighting

F117-Q—How are the engineer's instruments marked?
A—They are marked with fluorescent lacquer which glows under black light light illumination, enabling cab to be kept in darkness at night.

F118-Q—Is the intensity of light adjustable?
A—Yes, through a rheostat located just ahead of the controller.

F119-Q—What are the positions of this rheostat?
A—OFF and an adjustable ON range.

F120-Q—What other feature determines whether or not this rheostat is operative?
A—The heater and froster breaker on the panel must be ON for the rheostat to operate.

Load Ammeter and Brake Warning Light

(Bulletin 1706—101-A, page 19)

F121-Q—How does the Load Ammeter function?
A—The load ammeter indicates current to the traction motors on the front truck, either in motoring or dynamic braking, with a separate scale for each on the dial.

F122-Q—What is the limit of the tonnage to be hauled?
A—The tonnage hauled must be limited to that which will allow the load ammeter pointer to remain in the green or continuous zone when operating on the ruling grade.

F123-Q—How does the Brake Warning light function?
A—To indicate the point at which dynamic braking must be reduced.

F124-Q—Why must the dynamic braking be reduced when the warning light comes on?
A—Otherwise, traction motors and braking grids will overheat.

Schedule 24 RL Air Brakes

1777-Q—Referring to the first part of this pamphlet, why is the bridge purposely unbalanced during each half cycle?
A—This is done in order to energize relay Y.

1778-Q—What results from this unbalanced condition?
A—This unbalance results in a relatively large current flowing through relay Y.

1779-Q—What damage could result unless something is done about it?
A—The milliameter in series with the relay might be damaged by the heavy pulsing current unless some means were provided to protect the meter.

1780-Q—What arrangement is made for such protection?
A—This is one reason for using the lever switch S

which is illustrated in plate 11 by the small square with the letter S in it.

1781-Q—What type switch is the lever switch S?
A—This is a manually operated switch with several positions.

1782-Q—What is the function of the mid-position?
A—In the mid-position contact B1-B2 is closed, and thus places a short circuit around the milliameter.

1783-Q—What is thus accomplished?
A—Meter this way protected from damaging currents.

1784-Q—What happens when the lever of the switch is moved upward?
A—Contact B1-B2 is opened.

1785-Q—What is the result?
A—The short circuit is removed, allowing the meter to read the current through relay Y.

1786-Q—What other contact is on switch S?
A—Another contact, B3-B4 is connected in the common return circuit for the relays W and X.

1787-Q—How is this contact with switch in mid-position?
A—Closed.

1788-Q—What takes place with this contact closed?
A—This allows the normal pulsing action of relays W and X to take place provided the bridges are properly balanced.

Interchange Rules

This is the eleventh installment of a series of questions and answers on the Association of American Railroads Code of Rules Governing the Condition of, and Repairs to, Freight and Passenger Cars for the Interchange of Traffic which may help car men clarify their understanding of the philosophy, intent and requirements of the Interchange Rules. The answers given to the questions are not to be considered interpretations of the rules of Interchange, which can only be rendered by the Arbitration Committee acting officially. The comments, however, come from a background of intimate association with the application of the rules. Obviously, comments or opinions as of today may be inapplicable after a revision of the rules or further interpretations by the Arbitration Committee.

121-Q—Who is responsible for interior roof damage of house cars caused by lifts of fork-lift trucks being raised too high while operating inside of cars?
A—The same principle as outlined in Interpretation No. 3 to Rule 3 is involved in such cases. It is recognized that during loading and unloading operations by various means, the interior of cars, including floors, sides, ends and roofs may suffer some damage which, if not of a severe nature, can be considered as one of the hazards of the service.

122-Q—Who is responsible for frozen and bursted steam train-line, valves and metallic steam connectors caused by failure to properly blow out steam line on train?
A—In cases where handling line has definite knowledge that such damage was caused by failure to properly blow out steam train line, it should assume the responsibility for same. However, in the absence of such definite knowledge by the handling line, the damage would be classed as owner's responsibility.

123-Q—In handling a counter billing authority from a previous bill, is it permissible to deduct the amount involved when paying the next bill for repairs?
A—The intent of the A.A.R. counter billing authority issued under Rule 91 and shown on page 302 of the 1954 Code is that a bill be rendered covering same or included in another bill. However, if agreeable to the road which issued the counter billing authority, there would be no objection to same being deducted when paying bill. Some roads will handle by latter method.

124-Q—Is charge for one-half the allowance for repacking permissible where derailed car is subsequently sent to the repair track for examination of wheels and axles and it is necessary to renew 4 journal bearings account defective, the stenciled repacking date on car being between 12 and 14 months old?
A—Yes, charge versus car owner for 50 per cent of repacking allowance is proper.

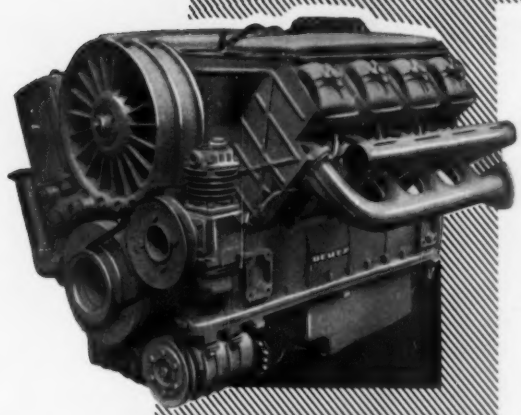
125-Q—Is there a conflict between Rules 1 and 66 insofar as shopping cars with old repacking date is concerned?
A—It is the intent of Rules 1 and 66 that empty cars moving home to car owner where there is a direct connection with the owner should not be shopped for old repacking date only.

126-Q—Is there any penalty in the present rules for failure to report to the car owner for disposition, per Interpretation No. (M-12) to Rule 17, a defective truck side frame removed which was cast subsequent to 1926, same being scrapped by the handling line?
A—No.

127-Q—What is the intent of the requirement in Paragraph (g-2) of Rule 66 where repairs involving change of wheels in unit type truck are made to cars set out of trains and placed on side tracks?
A—In view of Interpretation No. 3 to Rule 66, it is considered that outside points do not have proper facilities to meet the present requirements for repacking journal boxes. Therefore, where repairs as described above are made, involving the removal of journal box packing from four or more journal boxes and all journal boxes are not repacked and stenciling is not changed, Paragraph (g-2) of Rule 66 would not be violated.

128-Q—Is it considered advisable to adopt standard inspection requirements and standard form of commodity card, or cards, for use by all roads in carding cars fit for loading various commodities such as grain, flour, paper, cement, sugar, cereals, etc.?
A—Up to the present time, the adoption of standard inspection methods and standard forms has not been considered advisable, for the reason that various shippers located throughout the country shipping identical commodities have somewhat different requirements for approving empty cars placed for their loading. For example, some shippers prefer to line the floor and sides of box cars with some form of protecting material, thereby being able to accept cars with interiors somewhat less than in first-class condition, while others prefer to load cars as they are and therefore must have cars with interiors in better shape.

DEUTZ



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FOR RAILCARS
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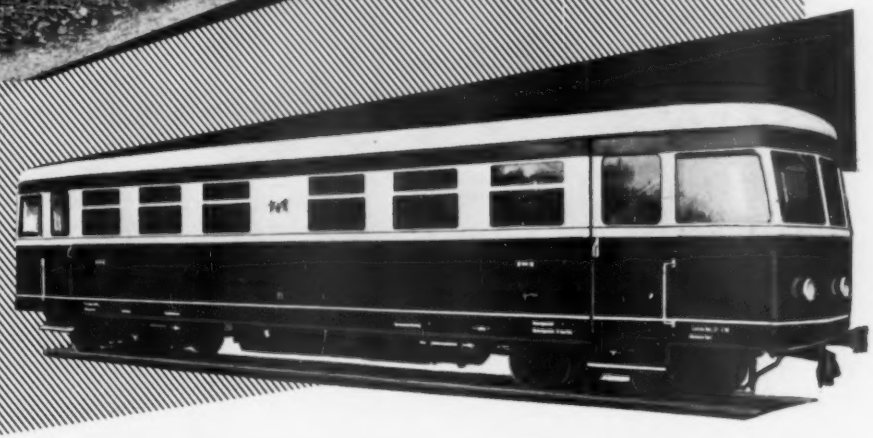

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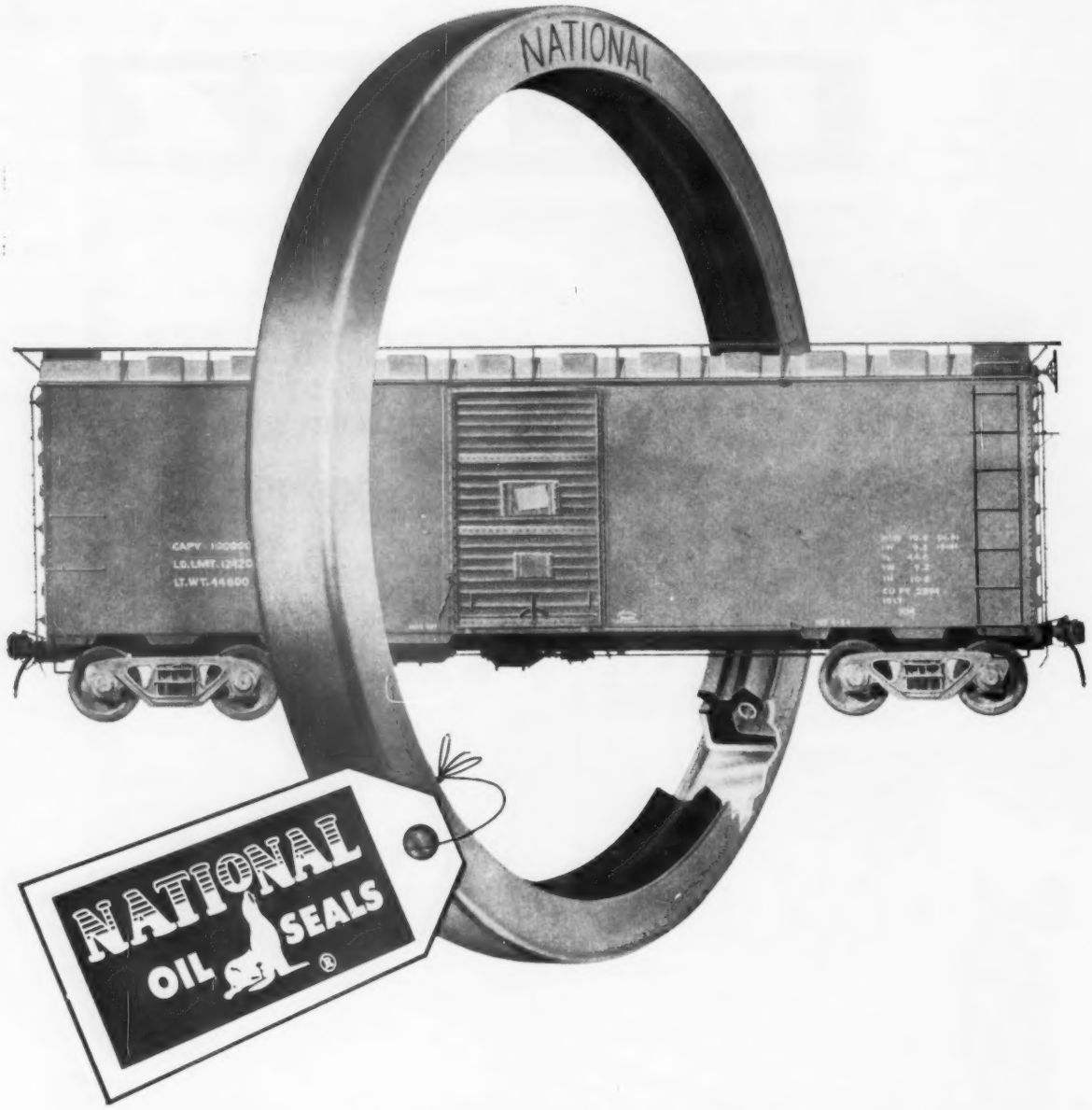

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What does this symbol mean to you?

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and its associated publications:
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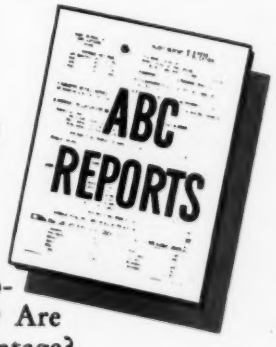

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The A.B.C. insigne is evidence that to the editor of an A.B.C. business publication, the reader is boss. To attract new subscribers, to produce renewals in good measure, the editor must give readers the benefits of steadily improved editorial value.

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Every paragraph in an A.B.C. business publication report gives such advertisers data valuable for the intelligent application of media to their chosen markets. Paragraph 10, telling them the business or occupation of a publication's subscribers, exemplifies the revealing A.B.C.-audited facts they need to build sound marketing plans, or create productive copy appeals. Because A.B.C. exists, specialized advertising appeals can go to clearly identified markets, through audited, paid circulation.

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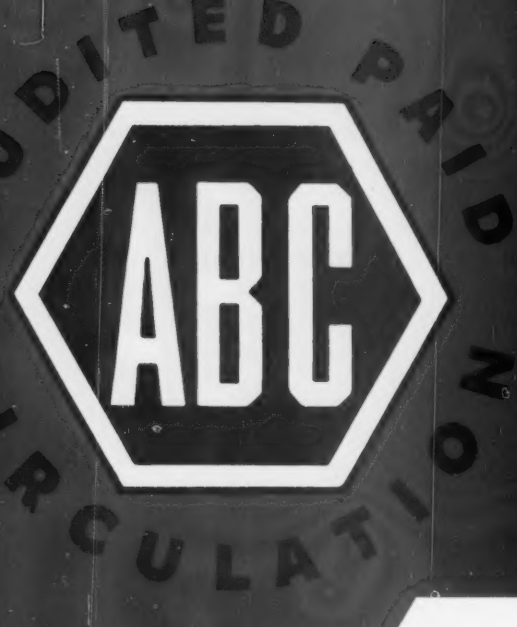

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With International cabooses, your trains can take full advantage of Diesel power — you can step up the length and speed of your trains to their maximum. You can get continuous, dependable service that means better, more efficient operation even with fewer units — for your new International cabooses will far outservice the old — and no amount of repair and restoration can ever change that picture. If you've never had an opportunity to see exactly how much you can save when you replace old, outmoded cabooses with new safety-engineered Internationals — let us go over the figures with you. No obligation on your part — and we promise you an interesting session!

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SPECIALISTS IN CABOOSES

UNITED STATES STEEL

USS HIGH STRENGTH STEELS

TWENTY YEARS OF PERFORMANCE

23,000 gondola cars have been built

USS HIGH STRENGTH STEEL

better with USS COR-TEN steel since 1934

COR-TEN steel construction prolongs life and reduces maintenance costs

by its superior ability to resist corrosion and withstand abuse

LIFE is hard for the gondola car. No other type of car has to transport such a diversity of heavy and bulky commodities. None is subjected to more severe and destructive service conditions.

For in addition to being constantly exposed to atmospheric corrosion, while carrying minerals of various kinds, or lumber, steel products or machinery, the gondola car also takes a beating every time it is loaded or unloaded.

That is why 24 domestic and 7 foreign railroads have turned to USS COR-TEN steel construction to keep down maintenance expense and to prolong the life of their gondolas. To date 23,000 COR-TEN steel gondolas have been built. More than 4000 of them have been in service from 10 to 16 years.

During that time, COR-TEN steel's ability to improve car performance has been amply demonstrated. These cars have stood up better than cars built of carbon steel. They have cost less for repairs.

Deterioration caused by atmospheric corrosion* has been greatly retarded because COR-TEN steel has 4 to 6 times the atmospheric corrosion resistance of carbon steel —2 to 3 times that of copper steel. And, because COR-TEN steel is 50% stronger than structural carbon steel, has 60% higher endurance limit, and offers greater resistance to distortion and denting, mechanical damage to these COR-TEN steel gondolas has been kept to a minimum.

Typical of the railroads capitalizing on these cost-saving advantages of COR-TEN steel construction are the Denver & Rio Grande Western which bought its first lot of 50 COR-TEN steel gondolas in 1939 and now has 4800 in service . . . the Elgin, Joliet and Eastern which started with 200 in 1936 and at present owns 2,000 . . . the Great Northern which bought 500 in 1944 and has added 700 since . . . the Atchison, Topeka & Santa Fe with 500 COR-TEN-built gondolas in service.

These representative roads and others on the long list of users of gondola cars that have been built better with USS COR-TEN can tell you how this tough, strong, corrosion-resisting steel pays off for them. We will be glad to tell you who they are.

**A recent railroad study showed that corrosion is responsible for 58% of the cost of repairs to gondola cars.*

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
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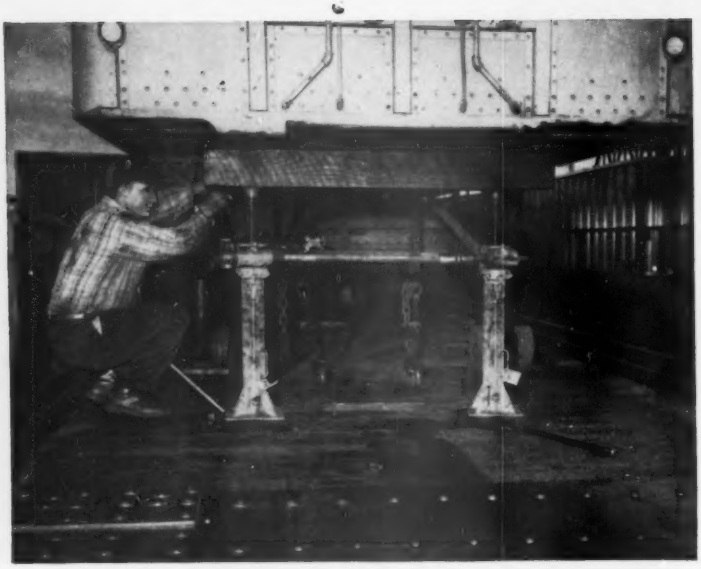

The Duff-Norton SK-1683 jack in use for piggy-back service.

Duff-Norton Special Jacks Help Assure Safe, Efficient "Piggy-Back" Service On Leading Roads

Many leading railroads naturally turned to Duff-Norton when they wanted special jacks to assure safe, economical piggy-back service. Six of the roads already have these Duff-Norton jacks in use. Others are working with Duff-Norton engineers in developing variations of them to suit particular methods of operation.

The men responsible for inaugurating piggy-back service on these roads know that Duff-Norton's long experience in designing and manufacturing jacks for special railroad uses gives them a dependable background for meeting this new situation. That is why the railroads whose trademarks you see here are using Duff-Norton jacks for piggy-back service. To learn more about these special jacks, write today to the Duff-Norton Mfg. Co., P.O. Box 1889, Pittsburgh 30, Pa. Canadian Plant: Toronto 6, Ont.

DUFF-NORTON

"Giving The Railroads A Lift Since 1883" **Jacks**

Personal Mention

(Continued from page 15)

over Canada Southern of Michigan Central District, reporting to Mr. Wardwell.

R. J. PARSONS appointed master mechanic, with headquarters at Harmon, N. J.

P. R. OLIVER appointed assistant master mechanic, with headquarters at Mott Haven, N. Y.

Western Region

J. J. WEIGET appointed general mechanical superintendent, with headquarters at Cleveland. Jurisdiction over Line West, Big Four, Peoria & Eastern, Michigan Central District (excluding Canada Southern), Beech Grove locomotive and car shops, and Collinwood, Ohio, diesel shop.

R. R. SNEDDON appointed mechanical superintendent at Detroit, with jurisdiction over Michigan Central District (excluding Canada Southern) and West Detroit Car shop, reporting to Mr. Wright.

F. C. RUSKAUP appointed mechanical superintendent at Indianapolis, with jurisdiction over Big Four District, including P&E and Beech Grove locomotive and car shops.

I. W. MARTIN appointed superintendent diesel shop, Collinwood, Ohio.

S. D. FOSTER appointed assistant superintendent diesel shop, Collinwood, Ohio.

W. H. CHIDLEY appointed assistant general mechanical superintendent—locomotive, with headquarters at Cleveland.

H. C. HAUPT appointed assistant general mechanical superintendent—car, with headquarters at Cleveland.

J. H. SALTZGABER appointed assistant mechanical superintendent at Indianapolis.

T. J. LYON appointed mechanical superintendent at Chicago.

New York, Chicago & St. Louis

ROY H. KIESER, general roundhouse foreman at Bellevue, Ohio, appointed master mechanic, Lake Erie & Western and Clover Leaf Districts, with headquarters at Frankfort, Ind.

Southern

WALTER W. SIMPSON, JR., appointed production and material control engineer. Hayne shop, Spartanburg, S. C. Title changed in lieu of assistant to manager.

Texas & Pacific

G. A. WEBER, superintendent of shops at Marshall, Tex., retired.

J. L. PERKINS, assistant superintendent of shops at Marshall, Tex., appointed superintendent of shops. Former position abolished.

T. E. ALBRIGHT, division superintendent at Alexandria, La., appointed mechanical superintendent at Dallas, Tex.

Wabash

C. W. GRAHAM, superintendent car department at Decatur, Ill., retired.

SUPPLY TRADE NOTES

CINCINNATI MILLING MACHINE COMPANY.—In observance of its 70th anniversary Cincinnati Milling has organized a series of specially arranged tours of its plants at Cincinnati for customers, technical societies and industrial groups, including conferences of its salesmen. This will cover a period of at least two weeks. A preview of the plant and the program was held for editors on October 7. Small motor-powered trains are used on parts of the tour, which cover the engineering and headquarters building, main plant, heavy machining plant, foundry, products division, and technical training center. The latter includes shops, class rooms, interview rooms, an auditorium, and Fred A. Geier (Founder's Memorial) Room, where 21 courses of training are being given. Of particular interest is the reproduction of the company's original shop as it appeared in 1884, with original Cincinnati machines actually built during that period. A new and animated approach to the problem of replacement to eliminate obsolescence is shown in a colored movie, "William Johnson and the Draggin." The concluding event in the tour is a circus the star performer in which is the new Cincinnati Hy Powermatic milling machine. Other tools unveiled at the editorial preview were a tool-room surface grinder and a new centerless grinder.

■

BARNABY MANUFACTURING COMPANY.—*Marc Benedict* has been elected

Marc Benedict

president, succeeding *Barnabus Toth*, who has retired. *Louis F. Kutscher* has been appointed sales manager.

■

EVANS PRODUCTS COMPANY.—*Ben Colman* and *W. J. Ritchie* have been elected vice presidents. Mr. Colman, who recently returned to Evans after a tenure as president of General American Evans Company, will head the Railroad Loading & Equipment Division, succeeding W. G.

(Continued on page 94)

GARLOCK REPLACEMENT PARTS

Gaskets—Packings—Molded Rubber Rings for diesel locomotives . . .

Section of Garlock's diesel parts stock room

NOW pre-stocked in handy packages, ready for immediate shipment

Packaging and labeling diesel parts after inspection.

GARLOCK diesel replacement parts—gaskets, packings and molded rubber rings—are packaged in convenient quantities for ease in handling, storing and redistribution to shop men, overhaul shops and terminal points.

All packages are labeled for instant identification—no cross-reference parts list needed.

Garlock diesel gaskets, packings and molded rubber rings are giving completely satisfactory service on leading railroads. Specify Garlock diesel replacement parts and write us for complete parts-and-price list.

THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK
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GARLOCK

PACKINGS, GASKETS, OIL SEALS,
MECHANICAL SEALS, RUBBER EXPANSION JOINTS

Solid bearing freight cars give $250,000 EXTRA on each 1000-car

You get from 6.25% to 10% more income from your investment when cars are solid bearing equipped—regardless of traffic conditions.

ALL labor and material costs for solid bearing operation, including overhead expense, come to less than the fixed charges on the huge investment necessary for non-standard bearings. That's established when you analyze the University of Illinois study of journal bearing operation* in the light of high initial roller bearing costs.

But the University also included costs for car delay days, based on problematical earnings and ownership costs. According to the University, the earnings presumed to be lost because of delay days constitute a significant percentage of the total costs for solid bearing operation.

How Problematical Earnings Prove The Case for Solid Bearings

When you talk about problematical earnings, you've got to relate them to *return on a prospective investment*, and not just to costs for an investment already made. That's the basis for all sound business procedure. Let's look at a case in point.

Suppose you're an average railroad with a given amount of money you can spend for *needed* freight equipment now. Say that the money you have is $6,600,000.00.

Now let's further suppose that the average freight car costs $6,000.00, and that this car could be equipped with roller bearings for only $600.00 additional. For the money on hand you could then buy 1100 solid bearing cars or 1000 roller bearing cars.

Do you want to know what the *loss* on the roller bearing investment would be? Here's a rule-of-thumb to figure it. Still assuming these 100 extra cars are needed, each of them will produce annual revenue of $4,000.00,** or a total of $400,000.00 per year. Then from this sum you subtract the difference, if any, in maintaining and operating journal assemblies on 1100 solid bearing cars as opposed to 1000 roller bearing cars.

Applying the Rule-of-Thumb to a 1000-Car Investment

But the costs for roller bearing maintenance and operation on freight cars are unknown. However, from the University of Illinois report we learn that solid bearing operating costs (including all delay day costs for periodic maintenance and train inspection, as well as hot boxes) range between $7.59 and $8.53 per 1000-car-miles.*** If each car accumulates 16,800 miles per year, maximum annual solid bearing operating costs would be $8.53 x 16.8 x 1100, or $157,634.40. Thus, your *minimum annual loss* on 1000 roller bearing cars would be $242,365.60 ($400,000.00 less $157,634.40) *plus* the annual expense for skilled labor and materials for roller bearing maintenance on 1000 cars, and *plus also* any loss of revenue sustained because of delay days due to roller bearing failures, maintenance and inspection, etc. Conservatively, if you specify solid bearings you gain from $250,000.00 to $400,000.00

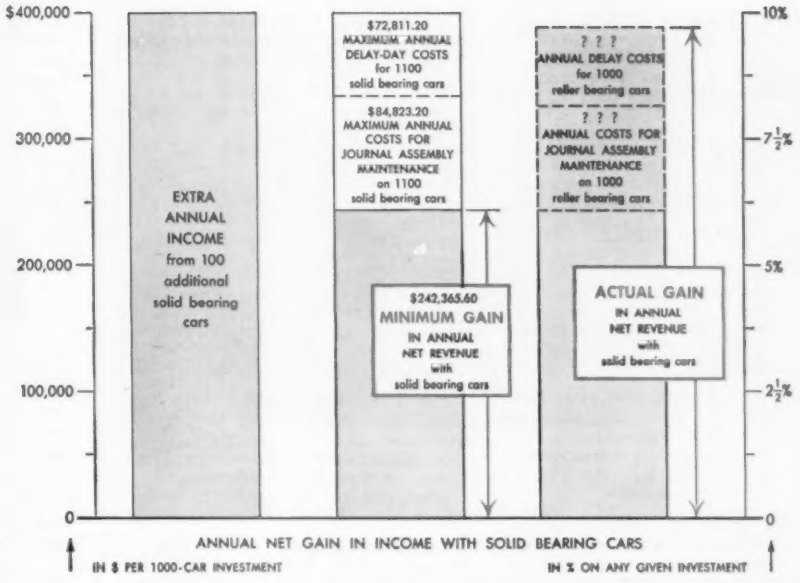
*University of Illinois Engineering Experiment Station, Bulletin Series No. 406: An Economic Investigation of Solid Journal Bearing Operation in Freight Service on Two Large Class I Railways; February, 1953.

**According to American Railway Car Institute, average revenue per freight car in 1953 was $4,351.00, and the average cost of all maintenance per car, including journal assemblies, was $350.65.

***These costs, while used here, are probably too high. See Magnus Bulletin No. 2068-68.

equivalent of
REVENUE PER YEAR
investment

The left-hand column shows the average extra annual revenue that can be obtained by buying 1100 solid bearing freight cars instead of 1000 roller bearing cars. The middle column graphically subtracts from this extra revenue all solid bearing operating costs on 1100 cars, and the remainder represents the minimum gain in net revenue that would result if roller bearings could eliminate all maintenance, delay, and failure costs. To determine the actual annual net gain, this minimum net gain should be increased by the unknown amount of the costs for roller bearing operation on 1000 cars, as indicated in the right-hand column. The reference line at the right indicates the percentage increase in return with solid bearings that can be anticipated for any given car investment.


$400,000
300,000
200,000
100,000
0
EXTRA ANNUAL INCOME from 100 additional solid bearing cars
$72,811.20 MAXIMUM ANNUAL DELAY-DAY COSTS for 1100 solid bearing cars
$84,823.20 MAXIMUM ANNUAL COSTS FOR JOURNAL ASSEMBLY MAINTENANCE on 1100 solid bearing cars
$242,365.60 MINIMUM GAIN IN ANNUAL NET REVENUE with solid bearing cars
? ? ? ANNUAL DELAY COSTS for 1000 roller bearing cars
? ? ? ANNUAL COSTS FOR JOURNAL ASSEMBLY MAINTENANCE on 1000 roller bearing cars
ACTUAL GAIN IN ANNUAL NET REVENUE with solid bearing cars
10%
7½%
5%
2½%
0
ANNUAL NET GAIN IN INCOME WITH SOLID BEARING CARS
IN $ PER 1000-CAR INVESTMENT
IN % ON ANY GIVEN INVESTMENT

for each year of operation, increasing your income at least 6.25% and possibly as much as 10%.

By the same token, suppose you only need 1000 cars to meet your traffic requirements. With solid bearings, you reduce your initial costs by $600,000.00 and you get the same proportionate increase in return per dollar of car investment represented by the $250,000.00 to $400,000.00 above. And since both freight revenues and bearing operating costs are proportionate to car use, this comparative increase in return with solid bearings holds true regardless of traffic conditions.

These hard economic facts prove the wisdom of present railroad policy to seek out and adopt the means for bettering solid bearing performance. For the most part these means are already available. Combine selective adoption of available developments with a program to improve maintenance standards and hot boxes will virtually disappear.

Write us for information about ways to improve journal bearing performance. Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

MAGNUS

Solid Bearings

Right for Railroads

...in performance...in cost

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

Manufacturers' Literature

Following is a compilation of free literature, pamphlets, and data sheets offered by manufacturers to the railroad industry. Circle the number(s) on the coupon below to receive the information desired; the requests will be sent direct by the manufacturers.

1. LOCOMOTIVE CRANES. *Ohio Locomotive Crane Co.* 16-page 2-color catalog describes, illustrates and shows capacity and clearance tables for the Ohio line of air controlled locomotive cranes.

2. CUSHION UNDERFRAME. *Waugh Equipt. Co.* 6-page 3-color flier "Available Capacity 90,000 Ft. Lbs." describes, diagrams and charts oscillograms (of forces produced in impact tests) on the Waugh high capacity cushion underframes.

3. RUBBER DRAFT GEARS. *Waugh Equipt. Co.* 6-page 2-color leaflet "The A-A-R Approves" describes the new Waughmat single action Twin Cushion that is interchangeable with standard friction gears.

4. SLINGS. *Caldwell Co.* 4-page folder (form 354) describes, illustrates and gives specifications for the Model 52 Adjust-A-Leg equalizing and locking sling.

5. AMERICAN BRAKE SHOE. *American Brake Shoe Co.* 48-page 2-color profusely illustrated catalog (H-104) "Your Guide to Brake Shoe Products" illustrates parts made by the company's eleven divisions, details physical properties or characteristics, and gives data on the complete line of industrial products.

6. V-BELT DRIVES. *Manhattan Rubber Div. Raybestos-Manhattan, Inc.* Colorful brochure (6638) explains with two-color line drawings design characteristics of the single, endless belt, the Poly-V drive belt power transmission.

7. LIQUID LEVEL GAGES. *Jerguson Gage & Valve Co.* 8-page catalog (246) describes, illustrates and gives design and construction features of Jerguson Convex Scale and Flat Scale Truscale Remote Reading Liquid Level Gages.

8. MULTIPLE WHEEL GRINDERS. *Landis Tool Co.* 12-page catalog (P-54) describes, illustrates 12 tooling set-ups for various shafts, and gives specifications for the 10"-14" Type H-IW multiple wheel precision grinders.

9. WIRE ROPE. *Macwhyte Co.* 4-page 2-color bulletin (5448) "Ropeology" shows on-the-job applications of Macwhyte wire ropes and cable assemblies.

10. MELTING & HEATING EQUIPT. *Inductotherm Corp.* Bulletin (60) describes the Inducto line of high frequency induction melting and heating equipment, including the new Inducto Melter unit; features melting charts which simplify selection of proper unit.

11. COOLING SYSTEM. *Cummins Engine Co., Inc.* Service Bulletin (Vol. 2, #19) "Give The Cooling System a Chance," contains many practical suggestions on the best way to care for an engine's cooling system (not just diesels, but all internal combustions).

12. GREASE. *Gredag, Inc.* 4-page bulletin (50-754) gives service recommendations for industrial lubricants.

13. BLAW-KNOX. *Blaw-Knox Company.* 50-page informational brochure (2425) "This Is Blaw-Knox" completely illustrates the diverse manufacturing activities of the company, contains data on all major departmental operations of the eleven divisions, places chief emphasis on products, services and their industrial applications.

14. FLOOR & WALL TILE. *Tile-Tex Div. Flintkote Co.* 34-page digest (form TD-4) briefly tells the history of Tile-Tex, describes the company, products and services, includes 4-color photos of actual installations.

15. ALLIS-CHALMERS. *Allis-Chalmers.* 32-page multi-colored booklet takes the reader on a trip, pictorially, through the Allis-Chalmers West Allis Works, shows on-the-job manufacture of the tractors and general machinery made at this plant.

16. ARC WELDING. *Hobart Bros. Co.* 24-page booklet (Vol. XI, #3) "Hobart Arc Welding News" contains interesting photos and articles on welding from all over North America, includes many time and money saving applications.

17. FIRE EXTINGUISHERS. *Stop-Fire, Inc.* 4-page bulletin discusses the subject of "speed at your fingertips to stop fires fast," describes the company's portable, one-hand operated "Redi-Grip" fire extinguishers.

18. SWEEPERS. *Homer Mfg. Co.* 4-page bulletin (MS-250) describes and illustrates uses, advantages, operational information and specifications of the complete Homer line of magnetic hand and road sweepers.

Reader Service Department — NOVEMBER, 1954
Railway Locomotives and Cars
30 Church St., New York 7, N. Y.

Please send literature circled below:

1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18

Also, please send me additional product information as follows: (company, product & page number) .....

Name ..... Title or Position .....
Company .....
Address .....
City ..... Zone ..... State .....

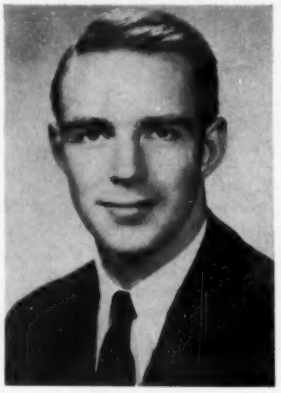
Webb. Mr. Ritchie, formerly general sales manager of the Wood Products Division, will have charge of that division's sales.

■

WARREN SOAP MANUFACTURING COMPANY.—The Rail Supply division of the Warren Soap, has appointed the *Carrier Supply Company*, of St. Louis, as representative in that area.

■

ACF INDUSTRIES, INC.—*John Furrer* has been appointed manager, Talgo project, of ACF Industries. Mr. Furrer, associated with the ACF Talgo train for



J. Furrer

over five years, has spent considerable time in Spain, where two Spanish Talgo trains have been in successful revenue operation for four years.

■

A. M. BYERS COMPANY—A. B. Drastrup, executive vice-president of A. M. Byers Company since last February, has been elected president to succeed *L. F. Rains*, Who retired October 1.

■

TEMPLETON, KENLY & CO.—*Charles E. Barnes* has been appointed special railroad representative, with headquarters in San Francisco. Mr. Barnes was formerly sales manager for the Griffin Wheel Company.

■

SOUTHERN ELECTRIC, INC.—The mechanical division of Southern Electric, Hammond, Ind., has expanded its operation to include manufacture of steel pipe coils for steam generators on diesel locomotives.

■

JOHN A. ROEBLING'S SONS CORPORATION.—*Charles C. Schackford* has been appointed product engineer of the Electrical Wire Division at Trenton, N. J.

■

LINCOLN ELECTRIC COMPANY.—*Robert J. Hirsch* has been appointed district sales manager at North Haven, Conn., and *Richard P. Lindgren* has been appointed district manager at Moline, Ill.

■

WESTINGHOUSE AIR BRAKE COMPANY, AIR BRAKE DIVISION.—*R. B. Morris* and *Kenneth Chrissinger* have been appointed representatives at New York, and *W. W. Wagner*, representative at Chicago.

Messrs. Morris and Wagner had been formerly district engineers at New York and Chicago, respectively, and Mr. Chrissinger, representative at Washington. *D. J. Blaine*, representative at Chicago, has been appointed district engineer at Chicago, and *J. A. Campbell*, district engineer at San Francisco has been appointed representative at San Francisco. *C. J. Storch* and *P. E. Fegley*, formerly service engineers at New York and Cleveland, have been appointed eastern district engineer at New York and district engineer at San Francisco, respectively. *J. G. Reese*, formerly representative at Chicago, has been appointed renewal parts service manager at Wilmerding, in charge of the warehousing and expedited service for railroad renewal parts.

■

L. J. BRASHER, formerly superintendent of motive power of the Belt Railway Company of Chicago, has been appointed superintendent of heavy equipment maintenance, railroad department of the Ford Motor Company at Dearborn, Mich.

■

NATIONAL MOTOR BEARING COMPANY.—*Richard T. Coyne*, has been appointed assistant to president, at Chicago.

R. T. Coyne

Mr. Coyne, who will be concerned with marketing and servicing the company's products for railroads, was formerly vice-president of Pressed Steel Car Company.

■

LEHON COMPANY. *George W. Casey*, formerly superintendent of manufacturing operations, has joined the company's railway sales division at Chicago.

■

DEARBORN CHEMICAL COMPANY.—*Herbert B. Mastin*, assistant vice president of the Eastern Railroad division has retired.

■

AMERICAN BRAKE SHOE COMPANY.—*Edward R. Anderson* has been elected a vice-president, continuing also as president of the AmForge Division at Chicago.

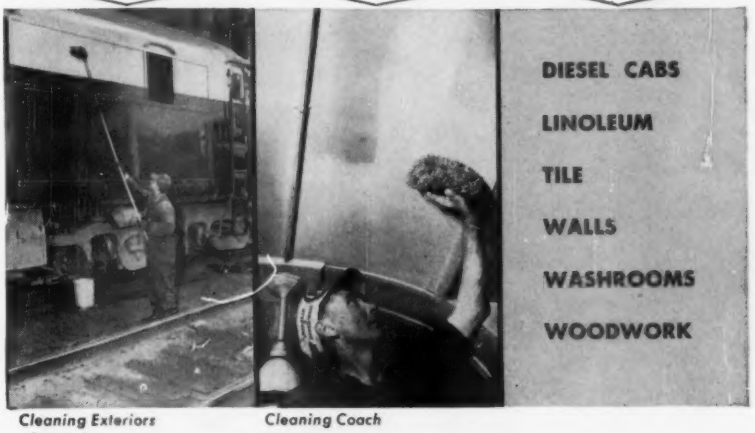
NATIONAL BEARING DIVISION.—*John E. Fries, Jr.*, has been appointed chief metallurgist at Meadville, Pa.

■

AMERICAN LOCOMOTIVE COMPANY.—*Stanley L. Haines* has been appointed

STOCK JUST One CLEANER

for this... and this... and these...



Cleaning Exteriors of Diesels *Cleaning Coach Interiors*

MAGNUS 5-RR provides a single, fast-acting, low-cost and completely safe cleaner for a great many railroad cleaning jobs. It disinfects and deodorizes as it cleans. It eliminates most of the heavy manual scrubbing. It is easy on the hands. It leaves surfaces bright, clean and streakless.

PUT IT TO THE TEST!

Order a trial drum of Magnus 5-RR and use it for 30 days according to our recommendations. If you are not completely satisfied with the job it does, return the unused material to us for credit of the entire amount of the invoice.

magnus CLEANERS

Railroad Division

MAGNUS CHEMICAL CO., INC.

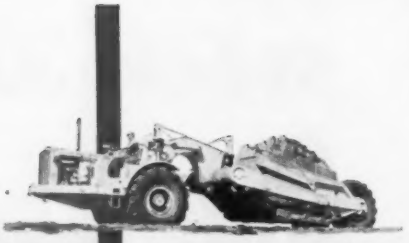
77 South Avenue, Garwood, N. J.

In Canada—Magnus Chemicals, Ltd., Montreal

Representatives in All Principal Cities

CATERPILLAR®

FIRST in earthmoving equipment—chooses . . .



Research Laboratories, Peoria, Illinois

PUNCH-LOK

FIRST IN HOSE CLAMPS

☆ no snag

☆ everlasting

☆ fast

☆ no leak

Ask for
Case Histories Booklet

"The Sign of a Good Hose Clamp"

5295

PUNCH-LOK Company

Dept. N, 321 North Justine Street, Chicago 7, Illinois

director of industrial engineering, with headquarters at Schenectady, N. Y. *Richard K. McCoy* has been appointed southern district sales manager, with headquarters

R. K. McCoy

in Chicago. *Col. W. G. Lockwood*, who represented Alco in Washington for 35 years, has retired, but is available as a consultant.

■

GARLOCK PACKING COMPANY.—*J. B. Sewell*, who has been appointed general sales manager at Palmyra, N. Y., as announced in the October issue, started with Garlock in 1935 as salesman for the Montreal area. He was appointed vice-president of the Garlock Packing Company of Canada in 1947, in full charge of the Canadian sales activities.

NEW DEVICES

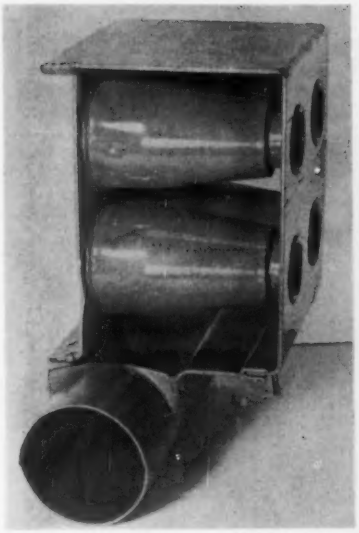
(Continued from page 6)

tinuous removal of the separated dust. The space available for installation required that the unit be compact and have a high air handling capacity per cubic feet of occupied space.

The performance characteristics of the unit, as originally developed and now manufactured, is said to be 68 per cent efficient on the 0 to 5 micron fraction, and 96 per cent efficient on the 5 to 10 micron fraction, and is close to 99 per cent on a mixture of particles 10 microns and over.

Rotonamic air filters were first applied to two locomotives destined for Saudi Arabia. Operating conditions were made difficult by frequent sand and dust storms. Various systems of air cleaning had been tried, but none was reported as giving a reasonable life. The filter box mounted a total of 16 Rotonamic panels on three sides. The bleed air carrying the dust was manifolded from each panel to ducts opening to the atmosphere through the floor.

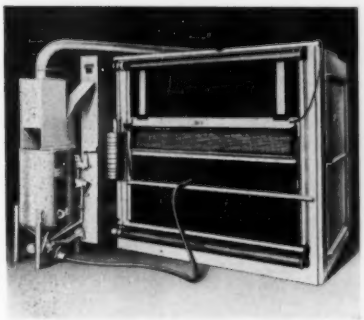
Each bleed connection was throttled to the correct 10 per cent of air inlet flow. The cleaned air then passed through a 4 in. impingement filter into the engine room. Four more Rotonamic filters filtered the air entering the engine from the engine room. Tests have also been conducted on



Rotonamic four-hole unit in its present form.

several American railroads using the General Motors Type F-7 locomotive.

The objective of this development was to increase effective filter life and to improve the protection of the engine with the additional benefit of removing engine air cleaner maintenance from the field of manpower failure. The unit is available from the *Farr Company, Los Angeles, Calif.*



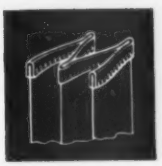
Armature Cleaning Machine

An armature cleaning machine now being made for the railroads utilizes a shelblast abrasive to clean the rotors and other parts of motors and electric generators for diesel locomotives while undergoing repairs. The equipment illustrated includes a sanitary-type steel room, with operator's protective curtain, and fitted with three 150-watt electric lights. This apparatus completely encloses the soft grit shelblasting operation and affords the operator complete accessibility to the work, adequate illumination on the blast zone, as well as full protection from rebounding abrasive.

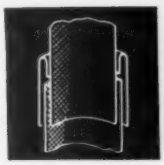
The primary blasting unit includes a

(Continued on page 100)

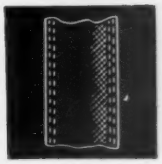
morton
DOES MAKE BETTER
VESTIBULE DIAPHRAGMS
here's proof
50 years
in the
making!
Lasting, positive protection — the diaphragm that has proved to be the best!
NOW AVAILABLE
The new Morton DL-Non-Flammable fabric for vestibule diaphragms. "Dynel" yarns, woven into a three-ply belting of Morton special 50-50 weave and then impregnated with black neoprene . . . a revolutionary, new material, highly resistant to strong detergents and soaps and inorganic acids, bases and salts. Excellent resistance to mildew fungus, fire and weather!



Leg-Ends Bound
Extra wear, longer life! Web-belting or chrome leather binding.



Exclusive Sectional Construction
Top section has 5 inch pockets into which leg sections fit — absolute weather protection.

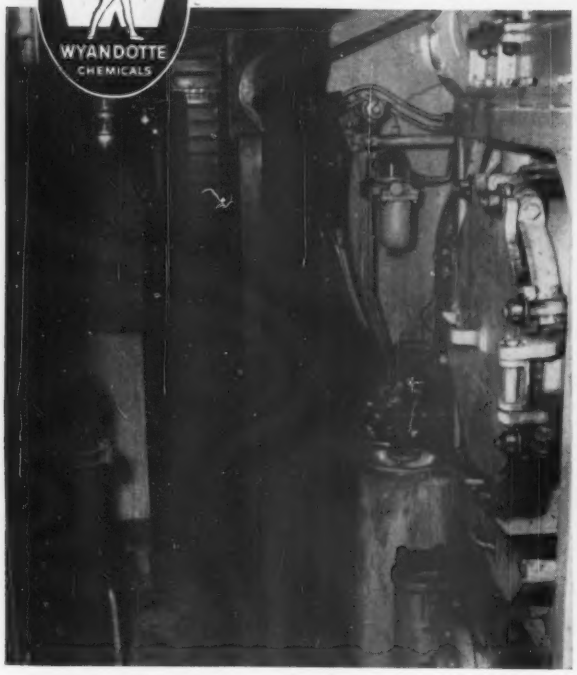


Impregnated 3-Ply Belting—Special solution for self-lubrication against friction, acid, fire, water, mildew and rot!

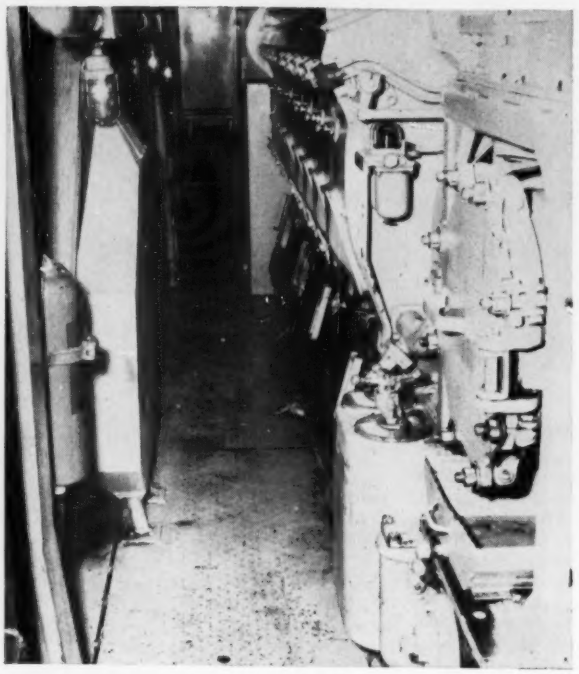
Parts Replaceable
Separate top and legs effects real savings on replacements!

morton
MANUFACTURING COMPANY
5125 West Lake Street, Chicago 44, Illinois

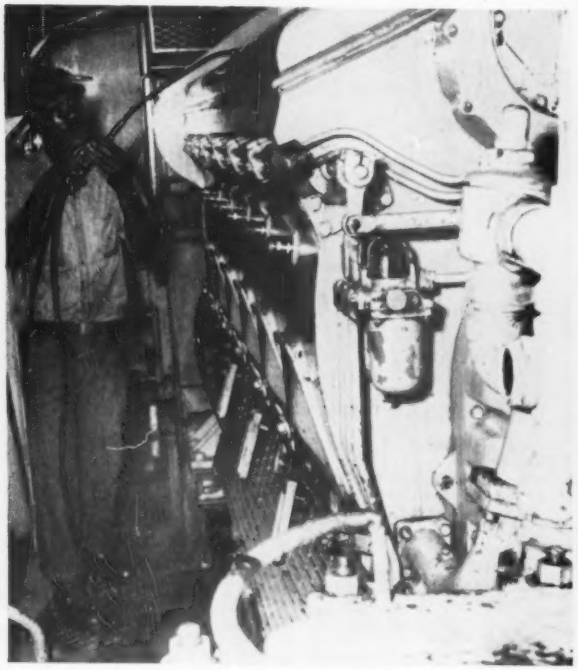
C&O cleans Diesel



BEFORE This Chesapeake & Ohio Diesel locomotive, wearing the grime of many hours of rugged service, is shown just before being given a bath — no longer a back-breaking job, thanks to Wyandotte's new solvent-type cleaner!



AFTER The entire interior of this C & O Diesel locomotive is sparkling clean — ready for service! Wyandotte solvent-type cleaner does this job at a saving of *two thirds* as compared to the previous cleaning method.



1 Member of C & O's cleaning crew is shown spraying soiled interior with Wyandotte's new solvent-type cleaner. Only simple, inexpensive pressure-spray equipment is needed for fast, efficient cleaning at lowest use-cost!

2 Wyandotte Cleaner penetrates, dissolves soil. Surfaces rinse clean without wiping when water is sprayed on (above). For quickest cleaning, use double hose-and-nozzle combination: one for solution; one for rinse water.

interiors for as little as

$1.35*

Back-breaking labor—even costly hand wiping eliminated with new Wyandotte solvent cleaner!

For the fastest, easiest, lowest cost Diesel-interior cleaning known, just spray on Wyandotte's new solvent-type cleaner — and rinse it off. Save time, save money, and get a better job!

The C & O and other railroads are cutting Diesel-interior-cleaning costs by more than 50% — and doing the job with 1/3 the labor cost, eliminating back-breaking work and hand wiping. You can do it, too, and enjoy savings of thousands of dollars annually. Let us show you how.

Mail coupon, today, for free sample and data. Also send for free book on other time-proved Wyandotte products formulated specially for railroad cleaning, paint stripping and maintenance. *Wyandotte Chemicals Corp., Wyandotte, Michigan. Also Los Nietos, Calif.*

*Cost of new Wyandotte solvent-type cleaner only.

Wyandotte CHEMICALS

Helpful service representatives in 138 cities in the U.S. and Canada

SPECIALISTS IN RAILROAD CLEANING PRODUCTS

3 Soil flushes away quickly, completely — as on this Diesel deck. New Wyandotte solvent-type cleaner mixes with water to make a thorough-cleaning, nonflammable solution. There's no obnoxious odor — and no damage to paint!

Clip and mail coupon, today

for free sample of new Wyandotte solvent-type cleaner!

Wyandotte Chemicals Corporation
Wyandotte, Michigan

- ☐ Send FREE sample and technical data on new Wyandotte solvent-type cleaner.
- ☐ Send FREE BOOK on railroad cleaners and cleaning procedures.
- ☐ Have representative call.

Name_____

Railroad_____

Department_____

Address_____

City_____ State_____

4 If this looks like the kind of efficient, low-cost cleaning operation *you'd* like to have, fill out this coupon, today! Put Wyandotte's new solvent-type cleaner to work cutting cleaning costs for your line, right away!

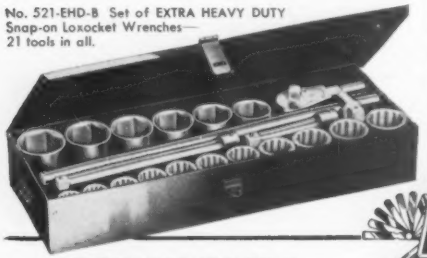
make FAST work of the BIG tie-ups!

Snap-on* EXTRA HEAVY DUTY LOXOCKET WRENCHES

● Because most machine maintenance jobs begin and end with wrench work, *the better your wrenches the faster, surer, safer the job.* Above is a perfect example—no room for a ratchet head or an open-end. But a Snap-on Extra Heavy-Duty Sliding Bar and proper socket gives a man a sure grip and sweeping power.

The full Standard Set of these powerful tools, pictured below, will give your crew the *right* equipment to break loose those big, rusted-on nuts and bolts, or to tighten them up to the limit . . . with no time-wasting makeshifts. There are many more shop-proved Snap-on tools that will save money in your plant—more than 4,000 to meet the widest range of needs. Snap-on gives you close-at-hand service through factory branch warehouses in principal industrial centers. Write for the Snap-on Special Industrial Catalog and 104-page General Catalog.

No. 521-EHD-B Set of EXTRA HEAVY DUTY Snap-on Loxocket Wrenches—21 tools in all.



SNAP-ON TOOLS CORPORATION
RAILROAD DIVISION
8130-K 28th Avenue, Kenosha, Wisconsin

*Snap-on is the trademark of Snap-on Tools Corporation.

direct-pressure generator, compressed air operated, which delivers crushed walnut sheel through a 1-in. supply hose to a 5/16-in. discharge nozzle. The operator directs the nozzle at the diesel armatures through the protective curtain shown.

The discharged shelblast compound falls to the floor, enters a V-shaped hopper where a mechanical screw conveyor picks up the material, passes it through a screening device and automatically recharges the blast generator with shelblast compound. This continuous operation assures a continuous supply of shell compound to the nozzle.

The dust and dirt created by the shelblasting operation is removed by means of a Ruemelin No. 755 tubular cloth-type dust filter, connected by suitable piping to the blast room and elevator system. A fan, driven by a 5-hp motor, keeps the entire blasting operation under negative draft at all times. The dust filter suppresses all fine dust particles. This shelblasting equipment is said to eliminate the use of obnoxious and toxic cleaning fluids, and effect appreciable time and labor savings. *Ruemelin Manufacturing Company, 3861 N. Palmer St., Milwaukee.*

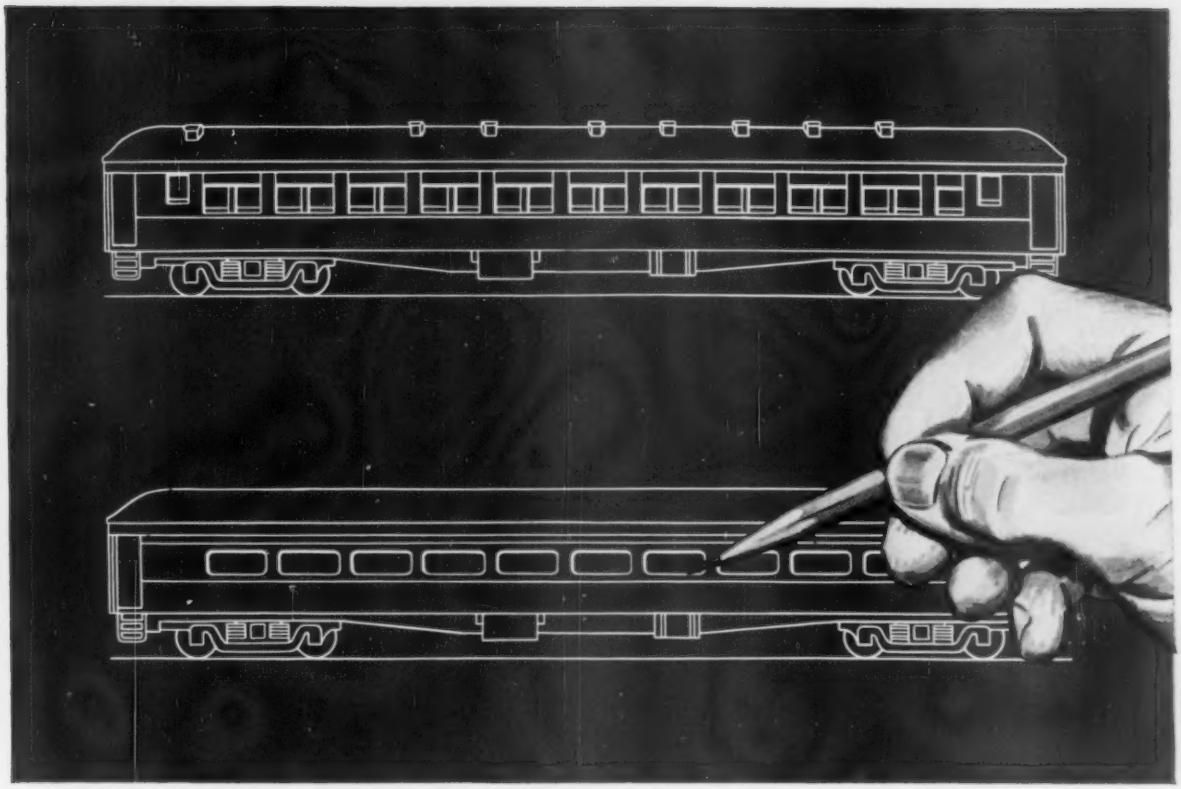
Simplified Welding Method

A method of welding that eliminates skills normally required, promises to make possible a quick method, usable to everyone, for joining metals. According to the designers, it should prove useful to establishments where repair or maintenance fabrication is desired.

Called Selfwelding, it employs a special welding electrode and holder. To make a weld, the tip of the electrode is held against the metals to be joined, a switch on the holder is pressed to fire the electrode, and the electrode automatically makes the proper weld.

A 100 amp welding unit has been introduced by the manufacturer for use with the process and it is called the Lincwelder 100. It can be operated safely on the properly fused electrical circuit of the average establishment, either 115 or 230 volts. *The Lincoln Electric Company, Cleveland 17.*

(New Devices continued on page 104)



What a difference **Adlake "Breather" Windows** can make!

REASONS: Most economical. Railroad managements know ADLAKE "Breather" Windows literally pay for themselves by reducing service expenses throughout their long life. And their "passenger appeal" is a valuable plus that pays off in passenger traffic.

Adlake Windows installed 20 years ago are as good as new. Mechanical officials know ADLAKE "Breather" Windows require no maintenance other than routine washing and keep their good looks and perfect seal indefinitely.

Glass replacement is easy. Maintenance men know that glass broken in service can be replaced in ADLAKE Windows right on the railroad's own property. Ends window troubles completely.

Scenery as advertised. Traffic executives know that passengers *see* clearly through ADLAKE "Breather" Windows regardless of changes in temperature, altitude and humidity.

For complete information write Adams & Westlake Company, 1152 N. Michigan, Elkhart, Ind.

Adlake 97th year of serving the transportation and building industries

THE Adams & Westlake COMPANY

Established 1857 • ELKHART, INDIANA • New York • Chicago

Manufacturers of ADLAKE Specialties and Equipment for the Railway Industry

"Let's Look at the Record!"

When all the conversation is done—it's the record that counts!

...the record:

Fairbanks-Morse 2400 horsepower Opposed-Piston Engines in Fairbanks-Morse Locomotives have set a record of less than one cent per mile for cost of repair parts.

And the Fairbanks-Morse opposed-piston engine requires the lowest parts inventory per horsepower in service.

...it adds up:

On the record it all adds up to a sound reason why the Fairbanks-Morse Train Master is your soundest motive power investment. Fairbanks, Morse & Co., 600 South Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE

a name worth remembering when you want the best

DIESEL LOCOMOTIVES AND ENGINES • RAIL CARS AND RAILROAD EQUIPMENT • ELECTRICAL MACHINERY • PUMPS • SCALES • WATER SERVICE EQUIPMENT • HAMMER MILLS • MAGNETOS

NEW DEVICES

(Continued from page 100)

Wire Screw Thread Inserting Tools

Power inserting tools for the installation of wire screw-thread inserts are designed primarily for use in plants using large numbers of screw thread inserts. The tools are powered by air and electricity.

These inserts provide strong threads in light, soft materials such as aluminum, magnesium, plastic and wood. They are used for repairing damaged and stripped threads, for corrosion resistance, for resistance to heat and for wear resistance in parts that must be disassembled frequently.

A kit containing 125 inserts in four commonly used sizes plus taps, manual inserting tools and an extractor will also be featured. *Heli-Coil Corporation, Danbury, Conn.*

Fuel Oil Filter

Designated as Type FSA-10A-1, for final stage use on diesel engines, this filter removes tiny particles of dirt from fuel oil which can cause wear on internal lapped surfaces of diesel fuel injection equipment. It is capable of removing abrasive particles

down to those less than 2 microns in size.

The device is equipped with a built-in check valve to prevent the possibility of incorrect installation as regards to direction of oil flow. Its filtering element is water resistant. The manufacturer states it has ample capacity for truck and tractor engines. For larger industrial engines, two filters can be installed in parallel hook-up. *American Bosh Division, American Bosh Arma Corporation, Springfield 7, Mass.*

BIDDLE *Instrument News*

Of Particular Interest to Railway Signalmen

Frahm® Miniature Portable Frequency Meters

Accurate, because the tuned reed is a natural resonant indicator.

Dependable, because permanent calibration is a natural characteristic of tuned reeds.

Sturdy and Maintenance Free, because there are no delicate pivots, jewels or moving parts.

Available in a Wide Range of Frequencies using 11 or 21 reeds tuned consecutively, or separate groups totaling 11 or 21 reeds and spaces. *We invite correspondence on special requirements.*

Low Input Power
No Wave-Form Errors
Input Voltage Not Critical
Unaffected by External Fields
Independent of Load, Power Factor or Phase Shifts
Applicable to pulsating or Interrupted d-c as well as to a-c circuits.

EASY TO READ
HOW TO READ
1. When the amplitude of a reed is at its maximum, and the amplitudes of those on either side are smaller and equal, the frequency is that of the reed vibrating at maximum amplitude.
2. When adjacent reeds vibrate with equal amplitudes, the frequency is half-way between the tuned frequencies of these reeds.
3. When one reed is vibrating with relatively large amplitude and the amplitudes of the adjacent reeds are unequal, the frequency may be determined by interpolation. As shown, the frequency is approximately ¼ of the scale interval higher than that of the reed with the greatest amplitude.
CYCLES
Catalog 6085
Range
93-103 cps

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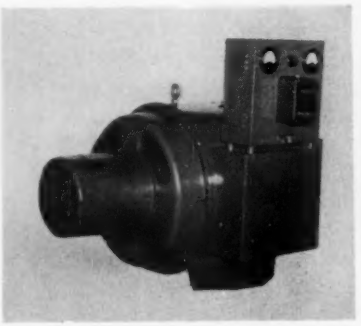

Generators for 30- to 100-KW Loads

A new series of Katolight revolving field type a-c generators are as much as 35 per cent smaller physically than previous designs, with frames of fabricated steel construction, oversize ball bearings, cast iron endbells and direct-connected exciters.

They are available as 1,800-rpm, 4-pole, 3-phase, 60-cycle, 208- to 600-volt machines, in sizes from 60 to 150 kw, and also single-phase, 115/230-volt units in sizes from 40 to 100 kw. The new series also includes 1,200-rpm, 6-pole, 60-cycle, 3-phase models in sizes from 40 to 100

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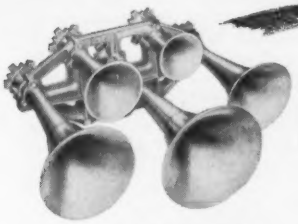

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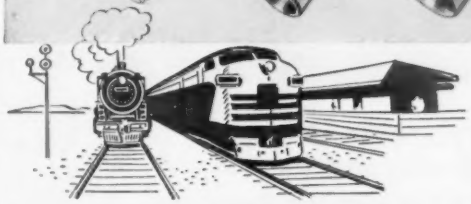


Keep your equipment out of the shop and on the rails with Ex-Cell-O steel pins and bushings. They give from four to six times longer service than ordinary pins and bushings. The tough ductile core of Ex-Cell-O pins and bushings withstands shocks, vibration; their hard case and fine finish resist abrasive action.

52-2)

Standard styles and sizes of Ex-Cell-O pins and bushings for steam, Diesel, and passenger car equipment are given in the new Ex-Cell-O Bulletin 32428. Write today for your copy.

RAILROAD DIVISION

EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN

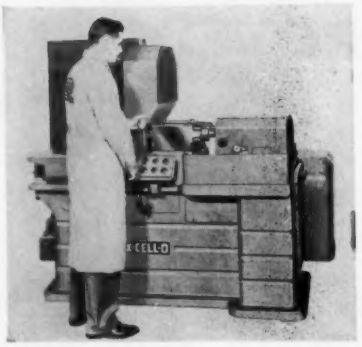
kw, and 30- to 60-kw, single-phase models.

The generators can be had in either two bearing construction, or with single bearings for direct engine adaption. The generators will maintin a 2½ per cent voltage regulation, with an automatic voltage regulator. They have Class A insulation, with temperature rise less than 50 deg C by resistance or 40 deg C by thermometer, except on the 100-kw, 1,200-rpm size, which is 52 deg C to 53 deg C by resistance. The efficiencies, depending on the size, are between 90 and 94 per cent. Fifty-cycle generators are available at 83 per cent of the capacity ranges given above. *Katolight Corporation, First avenue at Chestnut, Mankato, Minn.*

Rust-Proof Primer

The effective rust-proofing qualities of this primer are a result of a chemical reaction that takes place when the product is applied to a rusting surface, according to the manufacturer. This chemical development creates a special pigment from the interaction of the primer with rust particles. The result is an effective stoppage of further rust formation.

Storage tanks, structural iron work, outdoor equipment, etc., can be protected for longer service life. The formulation is available in pint, quart and gallon cans and in bulk. *Champion Bronze Powder & Paint Co., Inc., Department RMN, 2526 W. Van Buren Street, Chicago 12.*



Boring Machine

This device is cam operated, and is built for precision finishing work such as contouring, boring, turning, facing and grooving. Cam followers impart the rise and fall of the cams directly to the machine table and cross slide.

Known as Style 312, the unit was designed to accommodate parts that can be rotated on one or more spindles while the non-rotating tools are supported on the cross slide. Contour form is obtained from the longitudinal movement of the machine table coordinated with the lateral movement of the cross slide. The feed portion of the table stoke is actuated by a cam opposed by an air cylinder. All cross slide actions are produced in same manner.

Cams are hardened and ground, and are engaged by felt oil wicks to maintain a film of lubricant. Followers are tipped with tungsten carbide. Both the machine table and cross slide are supported on flame-hardened ways fitted with gibs for maximum stability. *Ex-Cell-O Corporation, 1200 Oakmon Boulevard, Detroit 32.*

Pennsylvania Railroad's Diesels depend on... FELPAX Lubricated Bearings

The suspension bearings on Pennsylvania Railroad's Diesels receive instant lubrication with the first revolution of the axle, continuous lubrication at all speeds. Waste grabs and starved bearings caused by old fashioned yarn packing are eliminated. Special wicks, exclusive with Felpax Lubricators, last thousands of miles . . . help maintain fast schedules.

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the lubricator that eliminates repacking

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WINONA, MINNESOTA

Paint Heating System

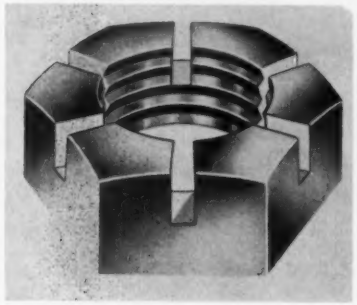
This paint heating system, which utilizes hot water, is designed for maximum efficiency in either large or small painting operations. According to the manufacturer, it achieves the ultimate in control of organic material temperatures for the hot

spray process. The units has only one moving part, a pump for circulating the hot water.

Material to be sprayed is heated in a heat transfer unit located near the spray station. Exchange of heat from the hot water is positive and speedy and paint cannot be overheated.

Water for the system is heated in a separate unit which can be located wherever most convenient. One water heater will handle several heat exchangers located at different points of usage. Each spray station must have a heat exchanger for each color which is to be sprayed at that station.

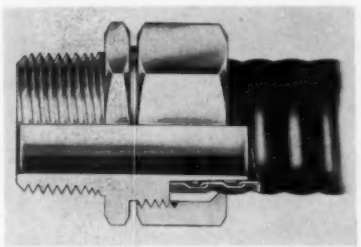
High degree of efficiency is attributed to its completely closed system. Each heat exchanger will heat up to 32 oz of material per minute. *The DeVilbiss Company, 300 Phillips Avenue, Toledo 1, Ohio.*



Free Running Locknut

A one-piece, free spinning, reusable locknut which locks itself when seated is now in production. The upper portion of this nut is slotted, and the bottom face is undercut so that when the nut is tightened the threaded upper segments move inward causing the nut to produce a vibration-proof lock on the threads of the screw.

All metal construction makes these nuts immune to the effects of both oil and water. They are made in all machine screw sizes in steel, brass or aluminum. *Jacobson Nut Manufacturing Corp., Kenilworth, N. J.*



Flexible Conduit Connector

A liquid-tight connector, designated Series CT, for use with Sealtight flexible conduit or equivalent has been made available.

Among its features, according to the manufacturer, is an extra strong grip. Compression force is supported by the body shank, not the conduit alone, making a vise-like clamp. Grippage is well behind end of flexible conduit for firm anchorage against creeping. A pliable sleeve makes a plastic-to-plastic grip with the conduit sheath, thereby avoiding cutting and abrason common to metal sleeves.

The connector affords less than 10 millivolt drop. Its tapered grounding shank, integral with connector body, makes a firmly wedged contact with the flexible metal conduit.

These CT connectors can be installed connected. They are available in straight, 45 degree and 90 degree types for ¾ in. to 2 in. liquid-tight flexible conduit. Meets U/L and J.I.C. standards. *The Pyle-National Company, 1334 North Kostner Ave., Chicago 51.*

Aluminum Welding Electrode

To provide maximum weld quality in the inert-gas, shielded arc welding of aluminum, a high quality welding electrode has been introduced. It was designed to be

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Lowest manual welding costs are achieved with "Jetweld", high speed welding electrode developed and introduced by Lincoln, and "Fleetwelder"—Lincoln's AC transformer-type welder.

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Average increases in speed are 35% and more.

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Lincoln's new combination of lower AC machine prices and faster welding with "Jetweld" can cut your welding costs. Get facts by writing the Lincoln Electric Railway Sales Company, 11 Public Square, Cleveland 13, Ohio, railroad representatives of:

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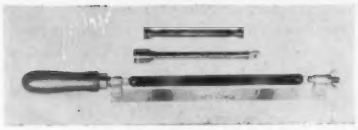
used in the welding guns employed with existing consumable electrode, shielded arc processes.

The electrode, known as Type I.G., is currently being produced from three aluminum alloys—2S, 43S and A54S. It is packaged and stocked in non-returnable fiber spools in 0.03, 0.04, 3/64, 1/16, 3/32, and 1/8 in. diameters. Tolerances of these diameters are plus 0.001 in. to minus 0.002 in. Each spool contains 10 lb of wire level wound in one continuous length.

Electrodes conforms with American Welding Society spec A5.10-54T and ASTM spec B285-54T. *Aluminum Company of America, Pittsburgh 19.*



Mechanic's Tools

Three new special-purpose tools recently announced are a hack saw, wobble drive extension and a nut setter or starter.

The hack saw, designated No. 2625, is designed for use in places where the high arch of ordinary hack saws makes sawing impossible. The wobble drive extension (Nos. AT4, AT5 and AT31) is said to give the mechanic "universal" action with 3/8 in. sockets and is available in 3, 6 and 12 in. sizes. The nut starters, set No. ZN20, can be used in places inaccessible to fingers and will hold hexagon nuts of any metal, plastic or fiber. The set contains four double end starters, handling nuts from 3/16 to 7/16 in. *Bonney Forge & Tool Works, Allentown, Pa.*

mr. nafco* says . . .
"Catching a 'jet' isn't for me, but when it comes to rolling up the mileage, ol' 'Mr. Nafco' is top dog in the Diesel Filter Cartridge department!"
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Fewer parts, minimum service, practically no upkeep, availability, promptest service!"
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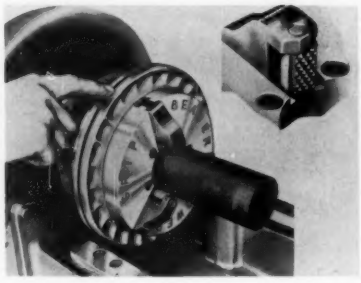
Split Tube Spring Pin

In assembling upper berths for duplex roomettes in stainless steel sleeping cars, the Budd Company had difficulty in attaching latch rods to a bell crank in the latch release mechanism. The answer was found by attaching the rods with Sel-Lok spring pins.

The pins can easily be inserted by tapping with a hammer and can be removed with a drift punch. As the pin is inserted, its axial slot narrows and diameter is reduced to that of the hole.

These pins can be furnished in 0.062 to 1/2 in. diameters up to 4 1/2 in. long. They may be plain, zinc coated, cadmium plated, phosphate-coated steel or corrosion-resistant steel. Available wall thicknesses are standard, light duty or heavy duty. *Standard Pressed Steel Company, Jenkintown, Pa.*



Wrenchless Pipe Machine Chuck

A wrenchless power grip type pipe machine chuck of 1/8 to 2 in. capacity which can be sized by a hand wheel has been marketed.

Tightening of the chuck is done with machine power, not by hand.

When power is turned on, roller grips tighten themselves according to the need, remaining tight and secure throughout the entire operation. The chuck cannot lock, slip, crush pipe or tubing and will not mar soft materials.

The manufacturer claims that the device is free running with no drag. Slight fingertip pressure is all that is needed to size the chuck for instant use. Forward or reverse is accomplished with equal ease, speed and gripping power. *Beaver Pipe Tools, Inc., Warren, Ohio.*

Pipe and Bolt Threading Kit

Now marketed is a compact pipe and bolt threading kit for use by plumbers, pipe fitters, electricians, etc. It is fully adjustable for standard and over and under standard pipe threads, and fully adjustable for four permissible nut fits.

The kit includes a hand threader, a set of ⅛ in. to ¾ in. pipe dies, a set of ¼ in. to 1 in. bolt dies and a ratchet. All dies are furnished in eighths. Sixteenth bolt sizes are available. Storage space is provided in the steel tool kit for the threader and all basic dies.

There are more than 100 additional dies available for use with the hand threader. *Beaver Pipe Tools, Inc., 300 Dana Avenue, Warren, Ohio.*

Steam Solution Cleaning Gun

This steam gun is suitable for cleaning and paint stripping of all types and sizes of machinery and equipment. For cleaning, a supply of live steam, a container of cleaning solution and hose lines is needed. No booster pump, motor or tank is required.

Passage of steam through the lightweight gun syphons the cleaning solution into the gun where it mixes with steam and is discharged from the high velocity

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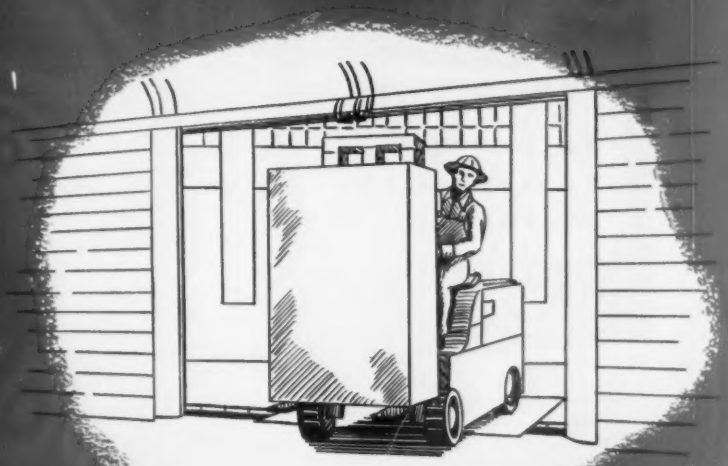
HARD AS STONE • NAILABLE AS WOOD • FOOT-SAFE SURFACE



Plastinail*

OXYCHLORIDE CEMENT BOX CAR FLOORS

Exhaustive "in service" tests by America's leading railroads have proven Plastinail to be your most practical and economical replacement for worn box car floors. Plastinail is hard as stone—resists wear and abrasive damage... smoother—makes loading and unloading easier, reduces claims for abrasive damage to bags and cartons . . . and is just as nailable as wood! In addition, Plastinail provides a Class "A" deck that has twice the strength and three times the service life of wood alone. Easy-to-install Plastinail floors can stretch your maintenance dollars and upgrade your entire car pool classification for increased revenue. Specify Plastinail as the Class "A" replacement for worn box car floors.

Note these advantages

• **Greater economy**—costs less to install, maintain, clean and repair • **Stronger**—compression strength of 3,500 # p.s.i.—density equal to hard maple • **Nailable as wood**—withstands impact; deflects without cracking • **Odorless; dustless**—unaffected by heat, cold or moisture • **SAFER**—not slippery; fire-proof; non-sparking • **Smoother**—monolithic surface reduces abrasive damage to bags, cartons—seals deck, makes it ideal for bulk laden • **Double the strength,** triple the CLASS "A" service life of wood alone

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nozzle. Strength of cleaning solution can be varied by a turn of the solution valve.

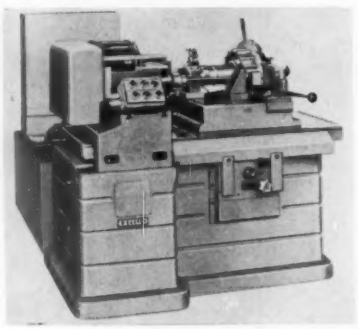
The gun is available in two heavy-duty models. Model S, weighing 4 lb is 41 in. long, while Model L weighing 4¾ lb is 53 in. long. Both units are equipped with ¾ in. steam connections, ¼ in. solution connections and deliver steam at 25 to 125 psi pressure. *Equipment Division, Magnus Chemical Company, Inc., Garwood, N. J.*

Live Center Set

The Repco combination live center set has been designed to handle a broad range of work. With a set of six adaptors, it provides a range from a point to a 6-½ in. diameter bell, and comes in a handy rack for storage.

The combination live center set is devised for rapid changeovers. A quick lock feature enables the entire assembly to be locked for changing or regrinding and for specific jobs where dead centers are required. The bell centers are secured by a button head socket cap screw.

All centers are hardened and ground and feature radial-thrust shank bearings for accuracy and load requirements. A tapped hole is provided for a grease fitting. *Rockford Engineering Products Company, Rockford, Ill.*



Gun Type Drilling

Bor-Dril is a method of machining holes from the solid, especially those too long for single-tool boring applications, and

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A *NEW* NON-CORROSIVE CARBON REMOVER

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F.O.-162 with its low toxicity reduces personnel illness on the job and assures them greater protection.

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A harmless and non-corrosive action on such metal surfaces as aluminum alloy, magnesium lead, zinc, copper, bronze, brass and steel add years of use to costly parts.

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holes in which it is difficult to maintain finish size. Bor-Dril operations use gun type drills on boring machines, way machines or special machines arranged either horizontally or vertically.

In the process, the drills usually rotate and the work is stationary. It requires coolant oil under high pressure directed through the drill. The coolant not only forces the chips out of the single flute, but also carries away heat.

When used with Ex-Cell-O precision boring machines, the new concept in gun drilling becomes practical. These units are rigid, have easily adjusted feeds and spindles capable of rotating either the drill or the work at high speeds. They are also adjustable for multiple spindle arrangements. *Ex-Cell-O Corporation, 1200 Oakman Boulevard, Detroit 32.*

Liquid Leak Detector

The formulation is a sensitive liquid for detecting the most minute leaks of gases, chemicals, oils, air, etc. It is reported to be non-inflammable, non-explosive and non-injurious to the person using it.

The detector is furnished in a polyethylene container. The liquid is squeezed through a special dispenser and applied to the surface or item to be tested. It can be used by maintenance crews for gas installations, transmission lines, pumping and compressor stations, etc. *American Gas & Chemicals, Inc., 45 Rockefeller Plaza, New York 20.*

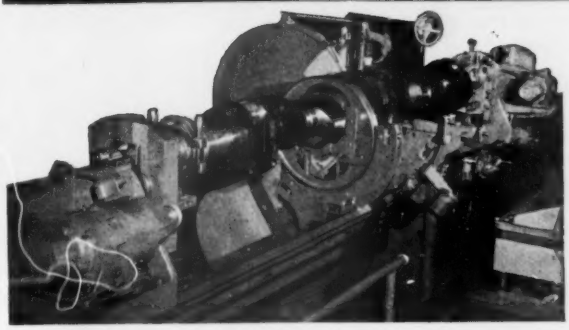
Oven Chain Lubricator

Designed for maximum safety, this oven chain lubricator speeds up lubrication of chains, rollers, pins and other movable parts. It is equipped with an extension applicator that permits the operator to lubricate formerly inaccessible sections.

The device, named the Reach Easy, consists of a pump, ¼-hp motor, 2-ft applicator, 9-ft hose and a slow-speed mechanical agitator. This assembly fits directly on top of a standard 5-gal can of lubricant.

The lubricator is available with or without a dolly. This dolly is surface protected

CRANKSHAFT GRINDING SERVICE



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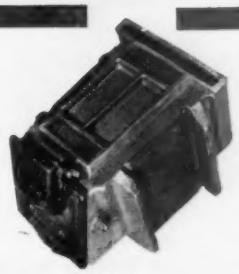

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Woodberry, Baltimore 11, Maryland
Chicago Office: 5001 North Wolcott Avenue, Chicago 40, Ill.

with white baked enamel and will hold two 5-gal pails of lubricant with attached lubricator. Four casters allow the dolly to move freely about the plant. *R. G. White Engineering Company, 1338 Atlantic Avenue, Brooklyn 16, N.Y.*

Catalyst Spray Gun

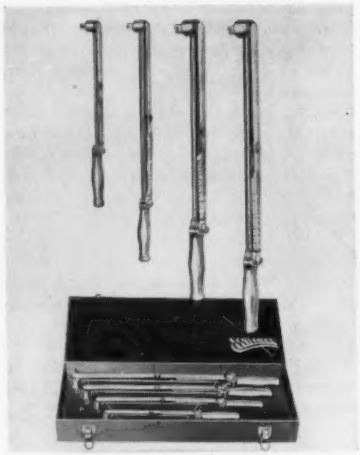
Designed to spray simultaneously plastic resin and catalyst, the gun is claimed to be the only one made which will assure a uniform mixture of resin and catalyst. With the gun, the resin is fed through the fluid line and the catalyst is introduced through the air stream. The gun has but one head. When the trigger is actuated, catalyst and resin meet outside the air cap and are atomized uniformly so the correct amount is applied to the surface being sprayed.

To insure a uniform mixture, the gun has a single pressure control for the resin and a double pressure control for the catalyst which is the governing agent in setting the resin. Dual atomizing air pressure control is also provided to insure uniform results regardless of main line pressure variation. *The DeVilbiss Company, 300 Phillips Avenue, Toledo 1, Ohio.*

Torque Wrenches

This series of torque wrenches, for measuring right and left hand torque, employs the converging scale method of torque reading. There are no mechanisms to get out of order, dropping will not destroy their accuracy.

The devices are made from alloy steel, heat-treated and chrome plated with calibrated areas buffed bright. They are available in four capacity ranges in two drive sizes. Model No B-58A has ⅜ in. drive, is 12 in. long with 0 to 150 in. lb capacity; No B-58 has ⅜ in. drive, is 15½ in. long with 0 to 600 in. lb capacity; No S-58A has ½ in. drive, is 18 in. long with 0 to 100 ft lb capacity and No S-58 has ½ in. drive, is 19⅞ in. long with 0 to 200 ft lb capacity.



The wrenches are sold individually and in a set which includes all four models. *J. H. Williams & Co., Buffalo 7.*

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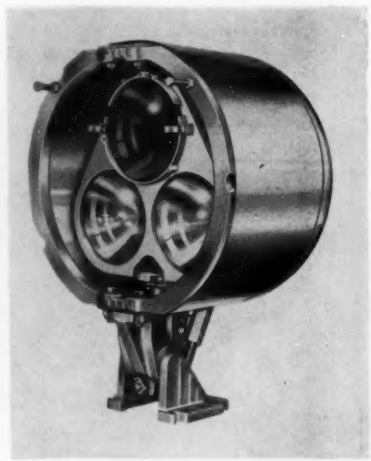


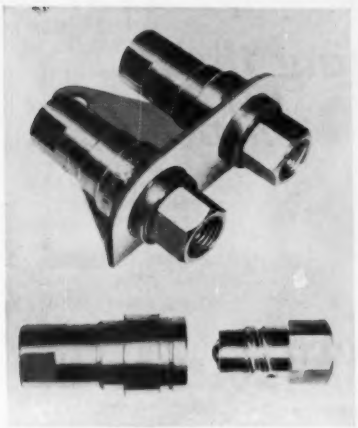
Three-Lamp Warning Lamp

The Pyle-National Company is now making a new model Gyralite locomotive warning light. It is distinguished by its use of three sealed beam lamps.

The unit, designated as type 20775, has a long horizontal beam movement to effect coverage of right-of-way and approaches to grade crossings. The vertical movement of the beam is sufficient to create a good sky effect and cover tall trees and buildings. Motorists or pedestrians who are within range of the beam see two direct flashes on each rotation, one when the beam is moving outward from the right-of-way, the other on its return, in its elliptical course.

The sealed beam lamp in the top posi-

tion is provided with a red filter. Color change is effected by either manual or automatic controls. The clear lamps serve as an auxiliary headlight when inched to the lowest beam position. *The Pyle-National Company, 1334 North Kostner Avenue, Chicago 51.*



Air Line Coupler

This quick connect and break-away coupler, known as the Jiffy, features a design for quick coupling which can be used with all hydraulically operated implements whether towed or mounted, semi-trailer trucks air compressor lines and many other industrial plant uses.

Made from rust-proofed steel with tempered valve seats and ball check valve construction, the device is said to insure a positive seal and can be either coupled or uncoupled under pressure without the use of any tools, nor loss of either pressure or fluid.

The couplers are available in sizes from ¾ in. to 1 in. *Standard Valve and Coupler Co., 1114 Ulysses Avenue NE, Minneapolis 13, Minn.*

Pressure Tight Fittings

These fittings currently available in ¼, ⅜ and ½ in. sizes in a variety of types and materials, eliminate the need for preflaring the tubing. The operator simply inserts the tube into the fitting and tightens the nut with ordinary wrenches.

The tube is flared automatically inside the fitting, forming the standard 37 degree seat required by S.A.E. and J.I.C. hydraulic committee specifications. Mated surfaces of the tube and internal flaring cone assure a leakproof connection.

Types available in these Flare-Matic fittings include male, female and union connectors, 90 degree male elbows and tees. They are manufactured in anodized aluminum, cadmium plated steel, monel metal and stainless steel. Brass fittings are also available for copper tube applications. *Century Products, 315 S. 15 Street, Philadelphia 2, Pa.*

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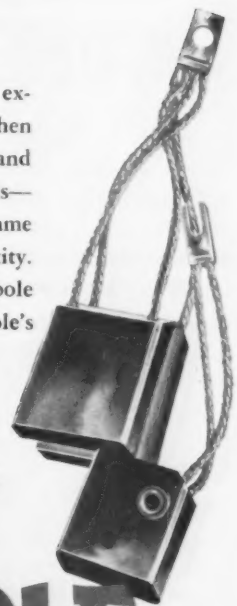
that ARE alike!



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WRITE FOR BULLETIN NO. 465

➡ OTHER TYPES OF MEGOHMERS CAN BE FURNISHED UP TO 2000 MEGOHMS WITH 1000V GENERATORS ⬅

HERMAN H. STICHT CO., INC. 27 PARK PLACE, NEW YORK 7, N. Y.

HEAVY DUTY SAFETY-RACHET ADAPTOR OFFERS MANY USES.

Featuring extra strength and safety, a new heavy duty ¾" square drive ratchet adaptor is now being produced by B. K. Sweeney Mfg. Co., 1601 23rd Street, Denver 17, Colorado. Designated Model 67A, this precision-built device converts any combination of work handle, extension, socket or torque wrench into a reversible, ratcheting action tool. It provides ratcheting speeds on many nuts where application of standard ratchet wrenches is impractical. Ratcheting action of the Sweeney adaptor requires a handle movement of only 10° and permits efficient use in limited spaces!

Eliminating protruding levers and buttons, the Sweeney tool employs a completely encircling reversing collar which minimizes the possibility of unintentional reversal. Directional markings are inscribed on the input face and reversing collar to note its driving action.

Four driving pawls are incorporated into the new tool, two of which are always in working position when driving in either direction. When the ratcheting action is disengaged, the Sweeney Adaptor is automatically in dead-lock. This positive feature makes the Sweeney Adaptor extra-safe.

Sweeney Mod. 67A H.D. Ratchet Adaptor

For further information, write the manufacturer at the address above.

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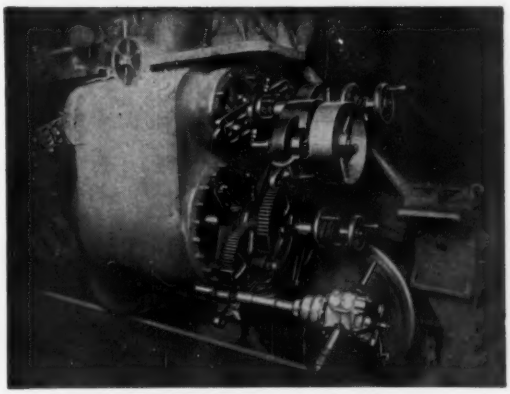
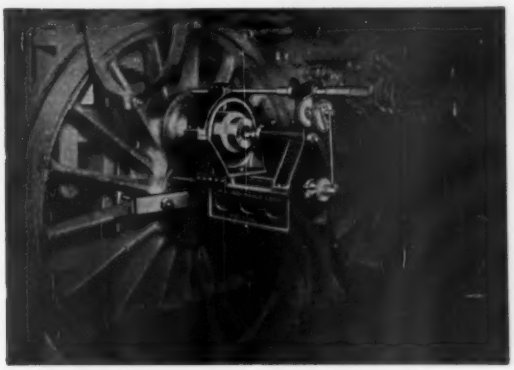
For Railway Shops and Engine Houses



Left: The Underwood Boring Bar illustrated is designed for reboring all sizes of locomotive cylinders and valve chambers.

Below: The Underwood Portable Crankpin Turning Machine returning crankpin in position.



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1. The names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, Simmons-Boardman Publishing Corporation, 30 Church Street, New York 7, N.Y.

Editor, H. C. Wilcox, 30 Church Street, New York 7, N.Y.

Managing editor, none.

Business manager, C. W. Merriken, Jr., 30 Church Street, New York 7, N.Y.

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H. C. WILCOX,
Editor.

Sworn to and subscribed before me this 1st day of October, 1954.

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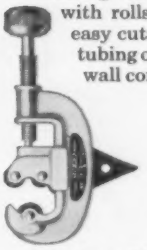

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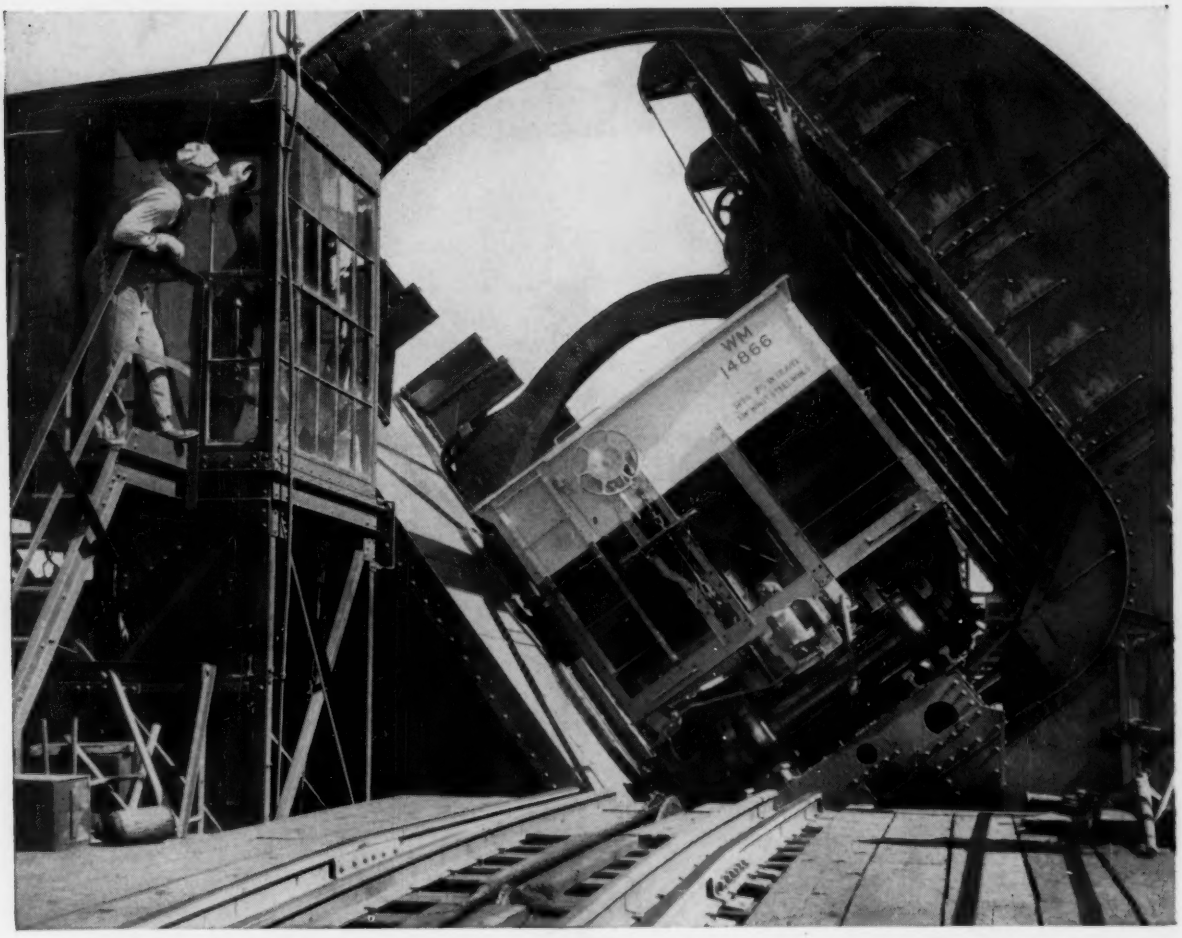

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Not when they're TIMKEN® tapered roller bearings

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That is, unless the cars have axles mounted on Timken® tapered roller bearings. Because they're tapered, Timken bearings take not only the up-and-down, or radial load, but the sideways, or thrust loads as well. Lateral movement within the bearing is impossible. There's no chance of scoring.

Furthermore, Timken tapered roller bearing journal boxes are equipped with rubbing seals. Only with this type of seal can there be assurance that there will be no leakage of lubricant when the car operates in a car dumper.

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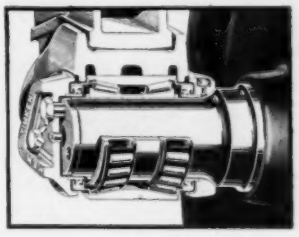

TIMKEN

TRADE-MARK REG. U.S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭

BEARING TAKES RADIAL ↓ AND THRUST →◯← LOADS OR ANY COMBINATION ✳